The NATIONAL GEOGRAPHIC MAGAZINE

Vol. XVI MAY, 1905 No. 5

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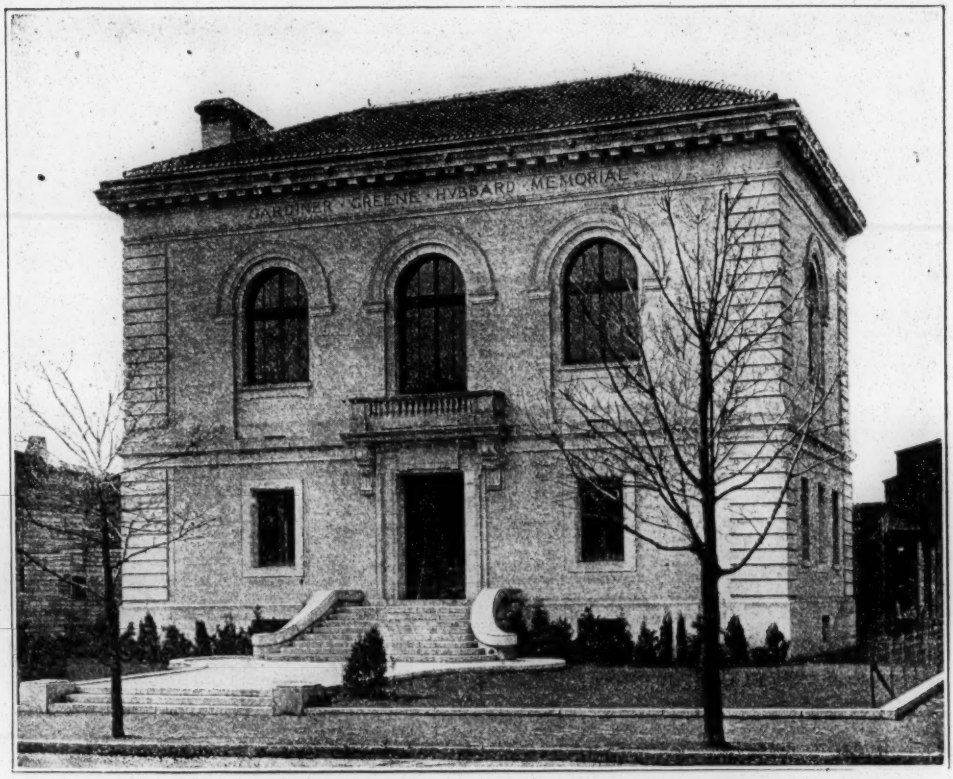

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VOL. XVI, No. 5 WASHINGTON MAY, 1905

THE NATIONAL GEOGRAPHIC MAGAZINE

THE FISHERIES OF JAPAN*

BY HUGH M. SMITH, DEPUTY U. S. FISH COMMISSIONER

THE Japanese farmer has been called the root of the Empire. The Japanese fisherman is a hardly less important member of the body politic, and, as it is quite likely that fishing antedated agriculture as an industry in Japan, it is not inappropriate that the fisherman's story be heard before the farmer's this evening.

Recent developments on land and water in the Far East have led to increased study of things Japanese, and we have learned of so many matters in which the Japanese people are eminent and preëminent that we are perhaps prepared for the statement that Japan in various important respects is today the leading fishing nation and has many branches of the fishing industry which are unique.

Probably in no other country of equal rank has fishing occupied a more prominent place in the material and esthetic development of a people. A mere glance at the map of Japan suggests the rôle which would be played by the sea. A numerous population, combined with a very limited area of arable land, at a very early period led to the development of important maritime interests. Centuries ago the Japanese had become the Phœnicians of the Far East. Their fisheries grew side by side with their navigation and shipping and became relatively more and more important with the more complete occupation of the agricultural land, so that at the dawn of the twentieth century we have seen the nation blossom out not only as a leader in the coastwise and foreign shipping trades and in fishing, but as one of the great naval powers of the world.

To quote an American student long resident in Japan, "Japanese art, poetry, romance, and folklore are full of the sea, its wonders and its possibilities for man. Even the ancient Shinto liturgies celebrate the blue plain of the sea, the ship and her equipment, the fishers and their spoils. Of the two gods of daily food seen in nearly every Japanese house one sits on two bags of rice, the native staff of life, and the other holds a *tai* or bream fish under his left arm, while his right hand grasps a fishing pole. These gods are not Buddhist or continental, but are of pure Japanese origin."

The fisheries of Japan are less valuable than those of several other countries, but they take first rank over

Abstract of an illustrated address to the National Geographic Society, March 17, 1905.

Photo by Hugh M. Smith

Hauling a Yellow-tail Net, Southern Shikoku. See page 212

those of all other nations (1) in the actual number of people making a livelihood thereby; (2) in the relative number of persons engaged in and dependent on the industry; (3) in the quantity of products taken annually from the water; (4) in the relative importance of fishery products in the domestic economy; (5) in the ingenuity and skill shown by the people in devising and using fishing appliances and preparing the catch for use; (6) in the extent to which all kinds of water products are utilized; (7) in the extent to which the fisheries of foreign countries have been studied and the best methods adapted to home conditions; (8) in the extent to which aquiculture has been carried; (9) in the zeal and intelligence displayed by the government in promoting the development of the fisheries and the welfare of the fishing population.

From the earliest times down to the present day, fishing has supplied the staple animal foods and a large portion of the vegetable and mineral foods consumed in Japan, and none of the other great powers is now so dependent on the water for subsistence. So important are water products and so numerous are their kinds and the methods of preparation, that I venture the assertion, from what I have seen of domestic life in Japan, that every day in every Japanese family some form of fishery food is served—I am almost ready to say at every meal.

The Japanese fishermen as a class are hardy, skillful, energetic, sober, self-reliant, to which qualities is superadded a spirit of intense bravery and patriotism, which makes them invaluable, indeed indispensable, in the crisis through which Japan is now passing. With ingenuity and deftness which, it seems to me, are unsurpassed by any other people, the Japanese have devised apparatus and developed methods which centuries ago brought their fisheries to a very high degree of effectiveness; but not content with this, they have within our own time superimposed upon and adapted to their own already well-nigh perfect fisheries all that is best and most useful in those of other countries, so that today fishing with the Japanese is more than a mere industry—it is almost a fine art.

EVERY KIND OF WATER PRODUCT IS UTILIZED

A striking feature of the Japanese fisheries, and one which might reasonably be expected in a people so frugal and ingenious, is the utilization of all kinds of water products which in the United States and in many European countries are wholly or largely neglected. In the matter of eating aquatic animals and plants the Japanese have few prejudices, and what they do not eat they utilize in other ways. As examples I may mention marine vegetables, to which further reference will be made, and sharks, which are among the commonest and most wholesome of the Japanese food-fishes. They are sent to the markets in immense numbers, reach there in excellent condition, and are butchered as beeves are in our country. I believe the time will come when we shall have attained that degree of civilization which will make fashionable the eating of sharks, skates, and similar fishes now generally discarded. Meanwhile many of us will be content to eat the so-called "fresh fish" of our markets, albeit days and weeks old, reeking with putrefactive bacteria, and kept "fresh" by contact with melting ice when not exposed to the air of a dirty stall.

Some of the factors which underlie Japan's prominence as a fishing nation have already been indicated. The geographical position and the physical character of the country have, of course, been potent in developing the fisheries. The extension of the Empire diagonally through 35 degrees of latitude and 38 degrees of longitude, the shape of the

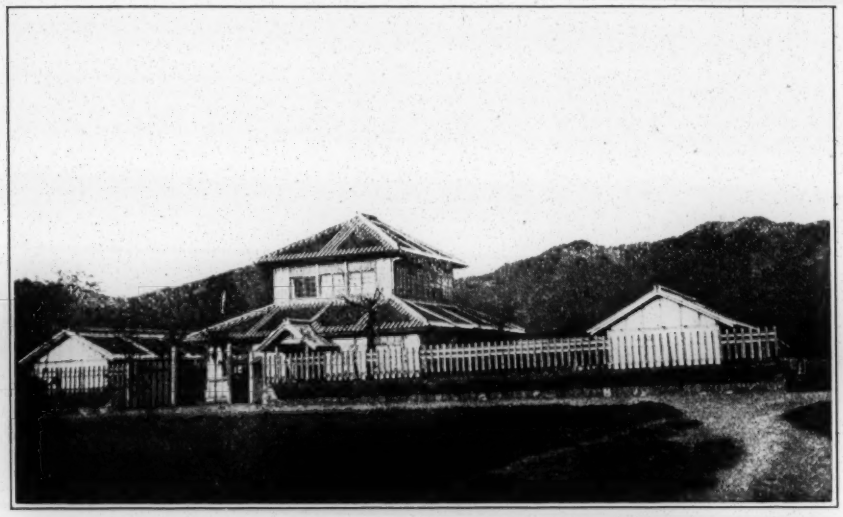


Photo by Hugh M. Smith

A Fishery Experiment Station in the Province of Tosa

archipelago, the thousands of islands, and the great length of the coast line (estimated at 20,000 miles) have brought a large part of the population within easy reach of the sea. To these is to be added a wonderful variety of water life, upwards of 1,000 species of fishes being already known and other classes being correspondingly well represented. Furthermore, there is a remarkable abundance of the most useful animals—some fresh water or anadromous species, some peculiar to the inshore waters, others high-sea forms which come close to the coast in immense numbers and are perpetually renewed, water several thousand fathoms deep being within a very few miles of the main islands.

THE GOVERNMENT FOSTERS THE FISHERIES

The attitude of the Imperial government has had a powerful influence in the growth of the fisheries. Since the Restoration the control of the industry has been vested largely in the central government, by which everything has been done that the most enlightened civilization could require to promote the interests of the fishermen and insure the prosperity of the fisheries. Long ago the Imperial Fisheries Bureau was organized, as a branch of the Department of Agriculture and Commerce, and is splendidly equipped and ably administered by specialists in fish culture, biology, economic fisheries, and fishery law. Its work is conducted on broad modern lines, with great stress laid on scientific investigation as the basis for legislation and promotion. With characteristic progressiveness, the government has sent representatives to America and Europe to study fisheries and fish culture, and the best practices of foreign lands have been adapted by the Japanese to their own special requirements. In each of the numerous prefectures there is a department of fisheries, and the local governments, not less than the central government, appreciate the value of experimental and biological work in connection with the fisheries, and have established many

stations and laboratories, which are rendering excellent service.

THE IMPERIAL FISHERIES SCHOOL

The Imperial fisheries school, located in the outskirts of Tokyo, is an institution which the Japanese may be pardoned for regarding with great pride, for in no other country does there exist a similar establishment which can compare with this in comprehensiveness of curriculum, completeness of equipment, and thoroughness of instruction. The last week of my sojourn in Japan I was invited to speak before the faculty and students of this school on the fishery work of the United States government. After I had been shown about the place and seen something of the methods and equipment I felt exceedingly doubtful of my ability to impart any information. The institution aims to equip young men for careers of usefulness in connection with the fisheries. The graduates obtain good positions in the government service and in fishing, fish-curing, and fish-cultural establishments. There are three departments of study, each with a three years' course, with provision for post-graduate work. There is a full corps of able professors, instructors, and assistants, some of whom have taken degrees abroad. English is a required study in each course. The department of fishing includes in its regular curriculum such subjects as methods of fishing, navigation, seamanship, shipbuilding, meteorology, oceanography, applied mechanics, applied zoölogy, applied botany, mathematics, law, economics, book-keeping, and elementary fisheries technology. The department of fisheries technology has special instruction in marine food products, marine industrial products, bacteriology, applied mechanics, chemistry, industrial chemistry, chemical analysis, applied zoölogy, applied botany, law, economics, and book-keeping. In the department of pisciculture the subjects are fresh-water culture, salt-water culture, protection of fish, embryology, bacteriology, oceanography, chemistry, applied zoölogy, applied botany, law, economics, and book-keeping. The institute has an annual income from the government amounting to $70,000, and several minor funds.

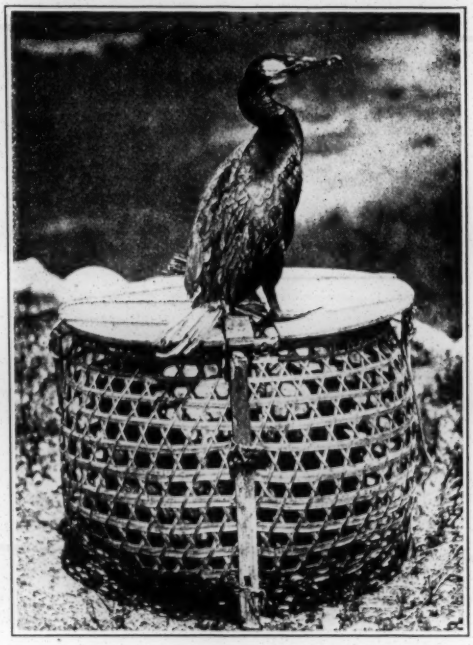


Photo by Hugh M. Smith

A Trained Fishing Cormorant, with Its Cage

THE RELATIVELY LARGE NUMBER OF FISHERMEN

Complete statistics of the Japanese fisheries have not been collated, and many details that one would like to know are not available, but enough is published officially to show the vast extent of the industry. The number of people who are engaged in the different branches is 3,000,000, as against about 215,000 in the United States. Nearly one-six-

Photo by Hugh M. Smith

A Cormorant Trainer and Fisherman

teenth of the entire population is employed in the fisheries, as against one five-hundredth in the United States. The annual tribute which the seas, the rivers, and the lakes now pay to the Japanese fishermen is worth about $30,000,000. The value of the United States and British fisheries is about half as much more; but while our fisheries produce less than 1,000,000 tons of products and the British only half as much, the Japanese yield the prodigious quantity of 3,000,000 tons.

A preponderating proportion of the fishery products is consumed at home, but certain articles are, nevertheless, exported in large quantities, and some products of the Japanese fisheries may be found in almost every civilized country. Over 80 per cent of the exports go to China, these consisting chiefly of prepared seaweeds, dried trepang, dried cuttle-fish, shark fins, and abalone. Strange to say, the country which ranks next to China is Italy, to which the exports comprise only coral. This is like "carrying coals to Newcastle," for Italy has been preëminently the country for corals. Hereafter when an American lady purchases a coral brooch or necklace in Naples or Rome or Venice, she may be reasonably certain that it was some hardy Japanese fisherman off the southern coast of Kiushiu or Shikoku who drew the rough coral from the sea. To Germany the Japanese export agar-agar and fish oils; to Korea, salt and kelp; to Asiatic Russia (formerly), marine salt; to Belgium, fish oil; to France, abalone shells; to England, fish oil, agar-agar, and sealskins; to Hawaii, dried fish and cuttle-fish. The exports to the United States are at present insignificant, and consist mostly of agar-agar, abalone, and dried fish, for the use of Chinese and Japanese.

The Japanese high-sea fisheries for whales, fur-seals, cod, halibut, etc., are important, and the lake, river, and pond fisheries yield large quantities of products; but the coastwise fisheries alone are sufficiently extensive to give Japan its prominent position as a fishing nation.

THE PRINCIPAL FISHERIES

Some of the most valuable objects of the fisheries are similar to or identical with ours. The sea herring is king of fishes in Japan, just as it is in some European countries and in the world at large. It is worth $4,000,000 yearly to the Japanese, and is particularly abundant in Hokkaido. Next in importance is the sardine, valued at $3,700,000. It is extensively canned and also eaten fresh and sun-dried. The bonito ranks third in value, the annual sales being $2,000,000. It is preserved in a peculiar

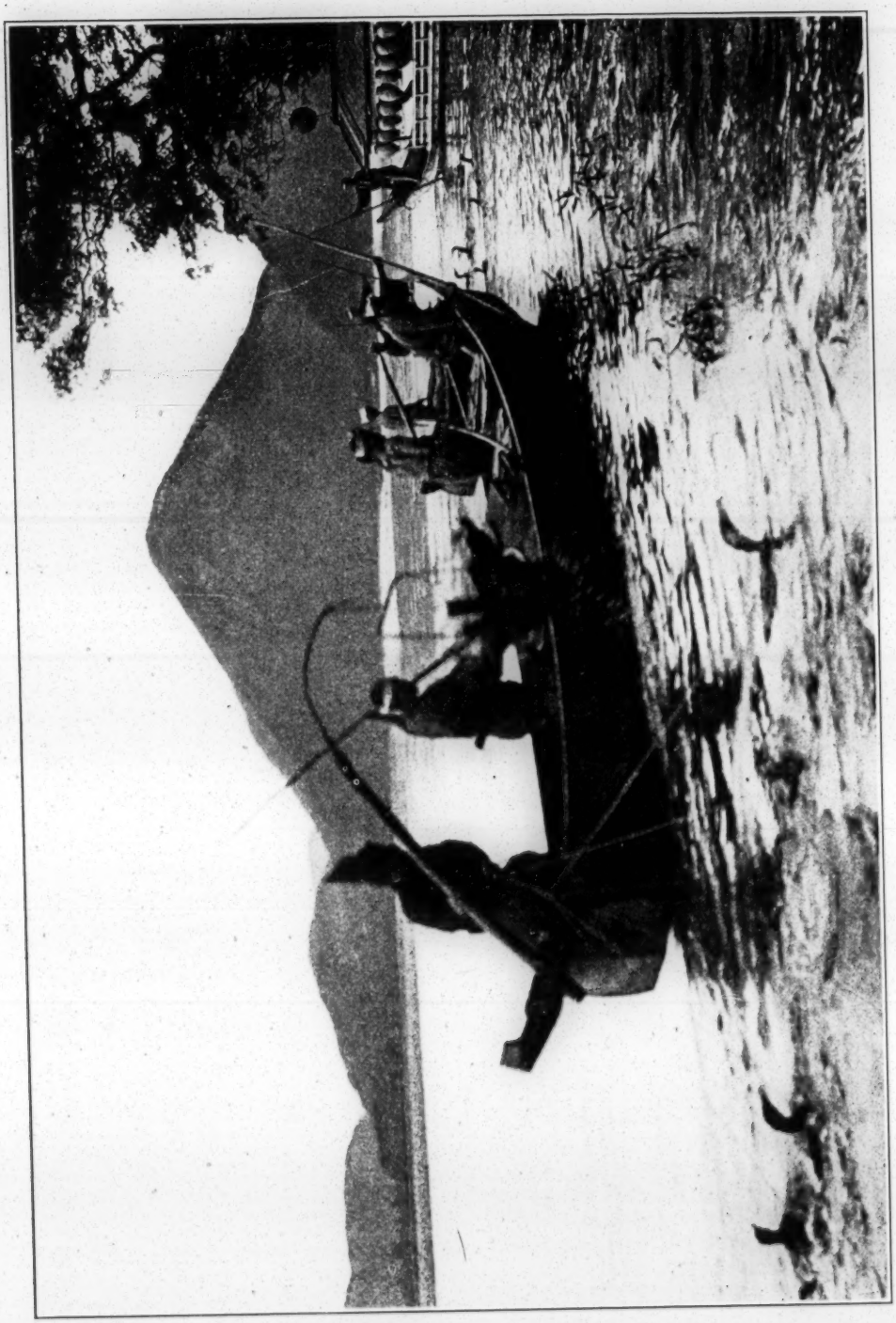


Photo by Hugh M. Smith

Fishing with Cormorants, Nagara River. See page 213

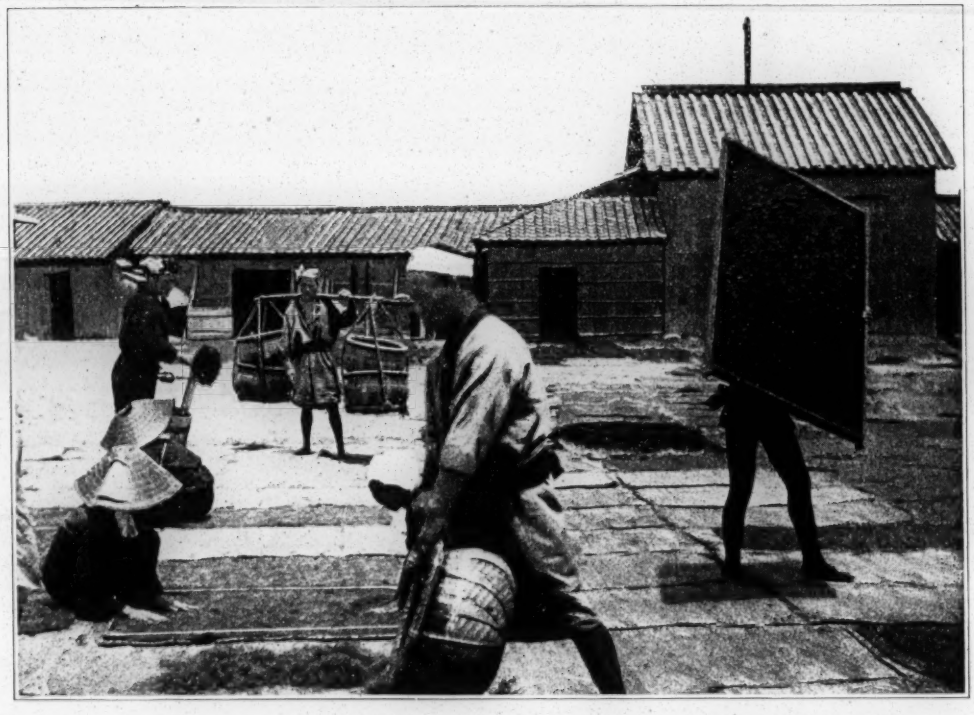


Photo by Hugh M. Smith

Spreading the Wet Funori on Mats to Bleach and Dry

From certain kinds of seaweed which they call "funori" the Japanese make excellent glue. The seaweed after being cleaned is soaked in fresh water and then spread out in thin sheets on mats. When sufficiently bleached the sheets are gathered and rolled up in bundles. They are then converted into a glue or a paste, when needed, by being put into boiling fresh water. The glue, which also is called funori, is employed principally for the glazing and stiffening of fabrics and as a starch for clothing.

way, and is always kept on hand as an emergency ration in Japanese houses. A fish similar to our scup, known as the tai, is worth about $2,000,000 yearly. It is the favorite fish for fresh consumption, and when served raw, with soy-bean sauce, is a delicious food. Other prominent products with which Americans are well acquainted are mackerel ($1,000,000), tunny or horse mackerel ($900,000), amber-fish or yellow tail ($1,000,000), squid and cuttle-fish ($1,500,000), anchovies ($800,000), prawns ($700,000), and salmon ($600,000).

The Japanese have no fisheries comparable with our shad, river herring, menhaden, striped bass, whitefish, pike perch, lake trout, soft crab, lobster, and sponge fisheries, and their oyster, clam, salmon, mullet, cod, halibut, and whale fisheries are insignificant in comparison with ours. On the other hand, our sea herring, sardine, anchovy, yellow-tail, tunny, bonito, shark, prawn, octopus, abalone, and seaweed fisheries are of minor value compared with theirs, and we have no cuttle-fish, sea-cucumber, and coral fisheries.

A characteristic scene in the larger coast towns is a crowd of men, women, and children on the shores at low tide searching and scraping and digging with

Photo by Hugh M. Smith

Sprinkling the Sheets of Funori to Prevent Curling

hand or stick or rake for any little fish or shell or crab or bit of seaweed that may serve as food. In Yokohama, where I first saw this practice, swarms of poor people appear on the beach at each period of low water, and seldom fail to carry home with them enough of the bounty of the sea to serve for several meals. Similarly, at low tide boats resort to the marshes and bars for the purpose of gathering any kinds of products that may have been stranded or that may be accessible by wading.

The Japanese have many holidays and festivals. One of the national holidays is devoted to girls, and another, in May, is the special property of boys. Besides games and festivities in which boys are particularly interested, a feature of this holiday is the throwing to the breeze from nearly every house hollow paper and cloth fishes, some of them 20 feet long, representing carp and having a special significance.

The Japanese make many presents, and it is the invariable practice to insert under the special cords with which a present is tied a peculiarly folded piece of decorated paper, within which is placed a small, thin strip of dried abalone. One of the most approved presents for New Year's day is a whole dried salmon.

Ingenious and important uses are made of many products which with us are mere curiosities. In a town near Tokyo I saw a shop devoted to the manufacture and sale of lanterns made from the dried skins of swell-fish. In the Loo-choo Islands water snakes are a common article of food. They are prepared for market by drying in an extended or

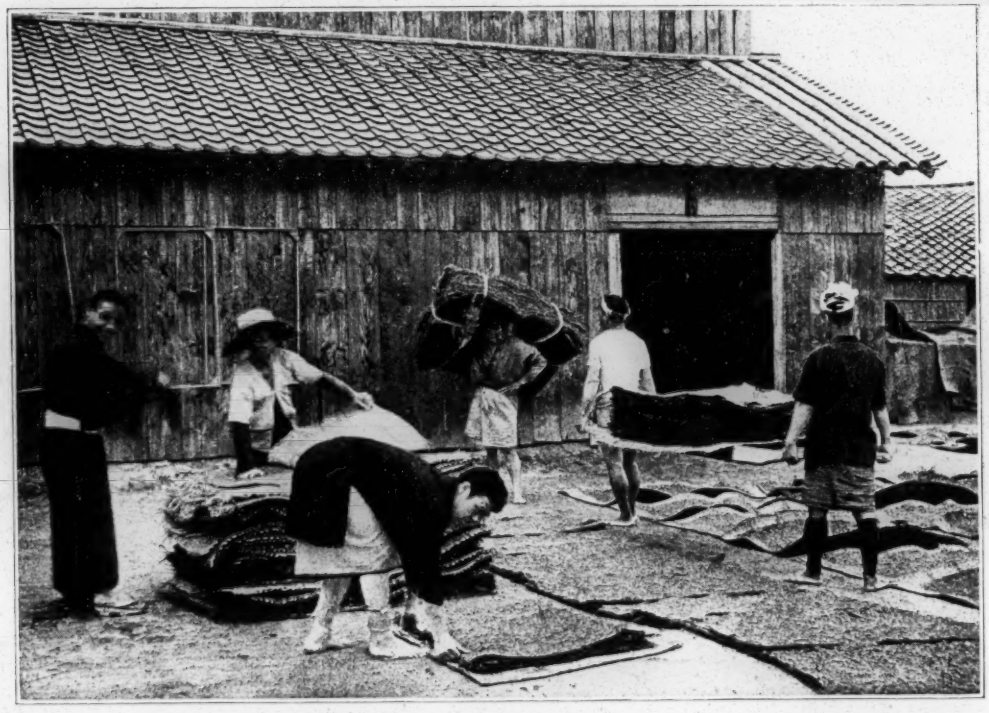


Photo by Hugh M. Smith

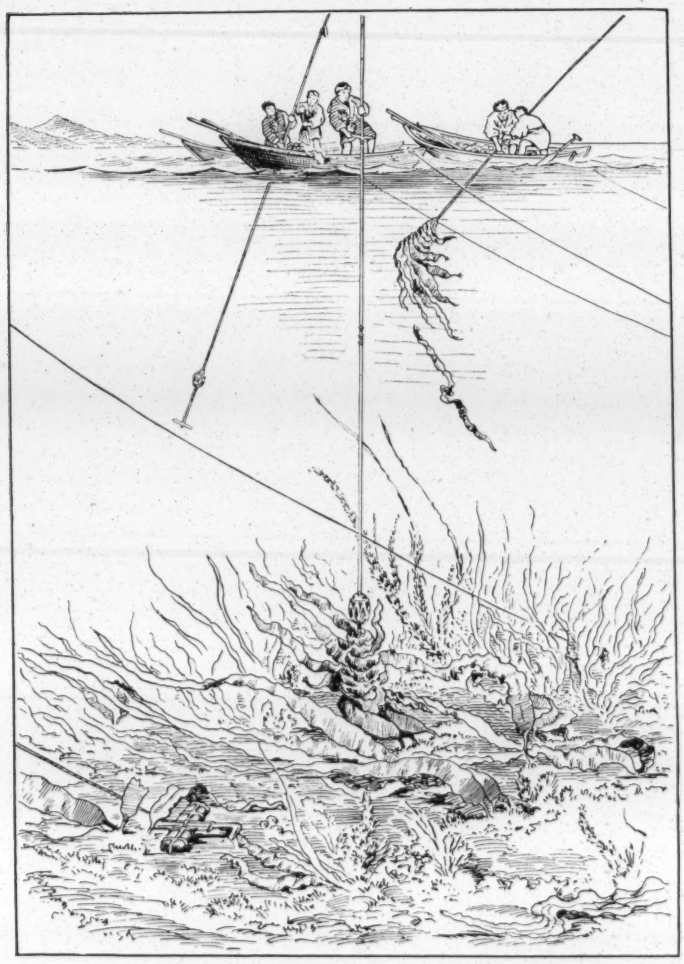
Gathering the Dried Sheets of Funori for Baling and Shipment

slightly wavy position, those I saw being about a yard long.

Nothing would seem to us to be of less value than the dried strings of egg cases of whelks, which are so common on our sandy shores, and yet in Japan I saw street vendors with push-carts loaded with these objects dyed a bright-red color and tastefully arranged on masses of wet seaweed, and many half-grown girls were buying them and making a blowing noise by putting them between the tongue and palate. The demand for these articles is so great that the supply obtained naturally is inadequate, and a kind of culture has sprung up.

FISHING JUNKS

Fishing vessels and boats are of various patterns, according to the region, the fishery, etc., but all those used in marine fishing are alike in being very strongly and heavily built, many being almost clumsy from our standpoint. They are usually constructed without the use of nails, and are not painted. The boats are for the most part arranged for sculling instead of rowing, and their crews are large. It is no uncommon thing to find 8 to 12 men constituting a boat's crew, whereas with us a similar boat and fishery would require only 2 to 4 men. The sails are frequently of the junk rig and sometimes consist of five or six upright widths of straw matting loosely laced together. The fishermen venture far offshore in small open boats, sometimes as much as 75 miles, in quest of certain pelagic fishes. The first intimation I had of the proximity of the Japanese coast on the voyage



From Hugh M. Smith

Gathering Kelp with Poles and Drags

A large business is done in Hokkaido, the most northern of the main islands of Japan, in gathering coarse broad-fronded seaweeds (Laminariaceæ) termed "kombu," which are used as pickles, seasoners, and relishes, and also as vegetables. Some varieties are served as sweetmeats and others made into powders and used as tea. The fishermen go to the kelp grounds in open boats, each boat with one to three men and a complement of hooks, with which the kelp is torn or twisted from its strong attachment on the rocky bottom. The hooks are of various patterns; some are attached to long wooden handles, and some are weighted and dragged on the bottom by means of ropes while the boats are under way.

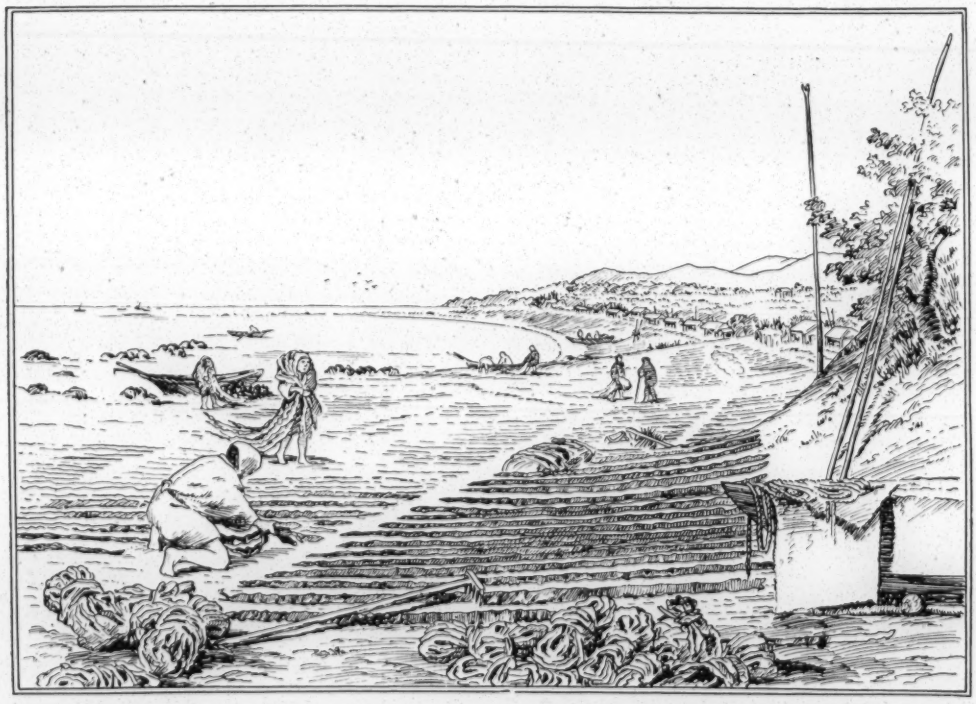
from San Francisco was the sighting of small fishing junks; and in order to inspect some of the fisheries in southern Japan in which I was particularly interested it was necessary to seek the fishermen out of sight of land. While the offshore fishing boats are sturdy, the government is not altogether satis-

fied with their suitability for the rough water and strong winds which prevail, and is endeavoring to introduce and popularize more seaworthy boats modeled after the American types.

CATCHING THE YELLOW-TAIL

Reference has been made to the importance of the amber-fish or yellow-tail. Along the southern shores of Shikoku the taking of this species is the chief fishery, requiring a large outlay of capital and employing many men. The apparatus used is a huge bag net, with long straight wings. When a school of fish has entered the net, the boats close in, the fish are driven into the bag, and are finally pocketed. I believe I am safe in saying that the yellow-tail nets are larger than any other set nets in the world and require the services of more men. Each net is attended by 25 to 30 boats, including a look-out boat with an elevated perch, and 150 to 200 men are in constant attendance. A net which I visited and saw drawn had two wings each 3,000 feet long, one of them extending to the shore; the bag was 900 feet long, 250 feet wide at its mouth, and 125 feet deep. During a season of two and a half months this net had stocked $50,000, which was an ordinary catch. On one occasion 10,000 yellow-tails, averaging 20 pounds each, were taken at one haul. A very useful method of preserving the yellow-tail, which insures cleanliness and easy transportation, is to soak the fish in brine, cut it into four lengthwise sections several feet long, remove the bones, wrap each piece in rice straw, and wind it with a straw rope. This preparation is called *maki-buri* and is an excellent food product.

The most remarkable of the freshwater fishes of Japan is the ayu or sweet-



From Hugh M. Smith

Drying Kelp on the Beach in Hokkaido

fish, and perhaps the most curious method of fishing is addressed to it. There is no time to refer in detail to this fish, and I can only say that it is a diminutive member of the salmon family, inhabits all the rivers of Japan and Formosa, being at its best in the mountain streams, is probably the most delicious of the fresh-water fishes, and has habits which are not possessed by any other known fish. It is an annual fish—the entire period of its life, from the egg to its death, covering rather less than a year. The Japanese have devised many appliances and methods for taking it, and, not content with pitting their own ingenuity against it, have impressed into their service one of the most skillful of fish-catching birds, the cormorant.

FISHING WITH CORMORANTS

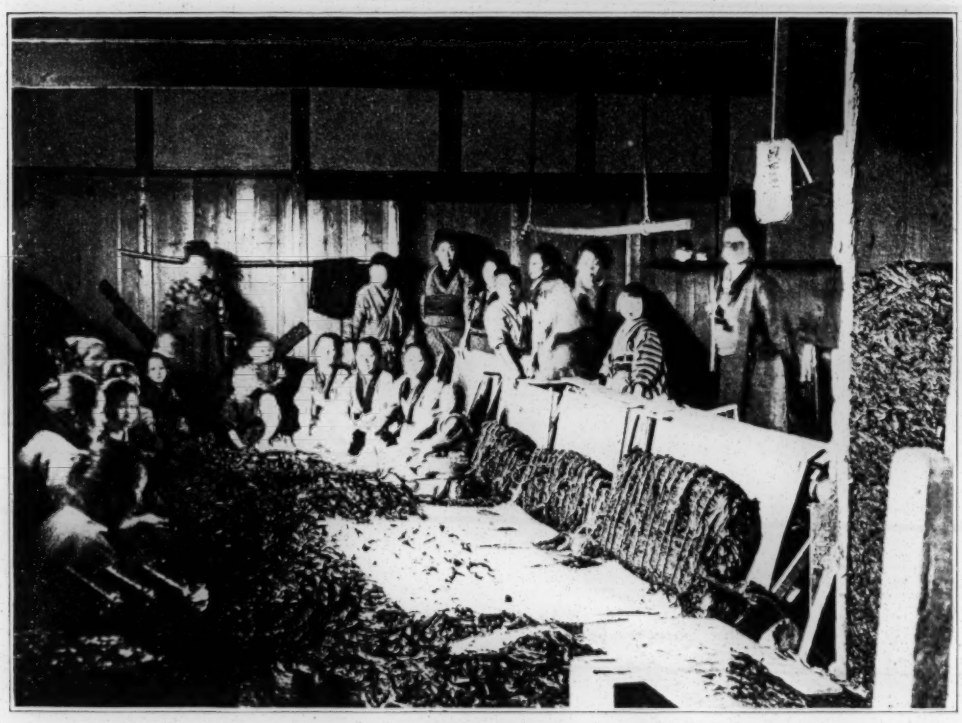
The origin of cormorant fishing in Japan is lost in a very remote antiquity. At least a thousand years ago it is known to have flourished, and there is a tradition of its existence upward of two thousand years ago. Much romance and history are connected with the fishery in the early days, and the names of some of Japan's greatest warriors and statesmen are associated with it. While a commercial enterprise, it does not, however, give employment to many people and is not conducted in many places. It is confined to rivers, and the most extensive, interesting, and famous fishery is that in the Nagara River and the most noted of the cormorant fishing villages is in the outskirts of the large city of Gifu.

At the time of my visit, the chief cormorant fisherman, whose ancestors for many generations had engaged in this fishery in the same locality, attired himself in the peculiar dress of the profession for the purpose of exhibiting his birds and the methods of handling them. Later he and all the other fishermen on the river went to a rendezvous and gave a practical demonstration of cormorant fishing.

The cormorants are controlled by means of a slender cord, which passes around the bird's breast and is tied in the middle of the back. The cord is made of woody fibers of the cryptomeria tree, with the exception of a short section next to the bird, which consists of whalebone. There is a supplemental cord tied around the neck at the lower end of the gullet for the purpose of preventing the fish from passing so far that they cannot be recovered. The tying of this cord is a delicate operation, for if too tight it may injure the bird and if too loose it will allow the fish to be swallowed.

The fishery is conducted from boats, which are of a special type, being long, narrow dug-outs, propelled primarily by paddles, but when en route to the fishing grounds often provided with a sail. Each boat has a crew of 4 men and a complement of 16 cormorants. Late in the afternoon the boats start for a place in the river where fishing will begin, the cormorants being stowed away in pairs in bamboo baskets. The fishing grounds cover many miles, and operations are confined to successive sections of the river nightly, in accordance with law. Stretches several thousand yards in length are set aside as Imperial preserves, on which no fishing is permitted.

As soon as darkness prevails, a blazing fire of pine wood is kindled in the iron basket overhanging the bow of the boat, and the boats drift downstream together, sometimes in a mixed group, sometimes in a line extending across the river, each guided and propelled by 2 men. The captain, standing near the bow, manages 12 cormorants and his assistant 4, the cords being held between the fingers and frequently shifted as the birds move about. With the cormorants diving and darting in all directions, those of different boats often mingling, it is a wonder that they do not soon become inextricably tangled, but so skillfully are they managed that the lines rarely become fouled. In a



Women Engaged in Sorting the Crude Kelp

short time the cormorants' gullets begin to bulge with ayu; when they are well filled the birds are pulled up to the gunwales one by one and their catch is gently squeezed into baskets. This continues for several hours, and each cormorant may fill its gullet fifteen to twenty times.

Spectators usually go to the fishing grounds in a kind of barge, illuminated by lanterns, and eat their dinner on board while waiting at a convenient point for the fishing boats to arrive. During the evening when I witnessed the fishery the seven boats in whose operations I was particularly interested averaged 700 to 800 fish apiece, and the aggregate catch was worth $1 50—a very respectable sum to Japanese fishermen.

The fishery is prosecuted with enthusiasm by both men and cormorants, and the shouts of the fishermen, the hoarse croaking of the birds, the rush of the mountain stream, the splashing and creaking of the paddles, the hissing of the embers as they fall into the water, the weird lights and shadows combine to make a performance which a westerner is not likely soon to forget.

TERRAPIN FARMS

The cultivation of water products has gone hand in hand with the fisheries, and in certain lines has attained greater perfection and extent than in any other country. The raising of terrapin, which with us is an unsolved problem and has only recently been seriously considered, has for years been very successfully carried on by the Japanese. I visited a terrapin farm near Tokyo, where 50,000

View at an Osaka Kombu Factory

Dyed kelp drying on poles; shredded kombu drying on mats and ready for baling

to 60,000 artificially grown terrapin are placed on the market annually. Without any outside aid or suggestions, the Japanese have evolved special methods for the cultivation of many kinds of mollusks, including the pearl oyster, the ark-shell, several clams, and various other lamellibranchs, and, in addition, the common oyster. That the Japanese should realize the importance of oyster culture is not strange; but that they should have taken it up a century before our nation was born and have recognized the most essential factor in successful cultivation, namely, individual ownership or control of the oyster bottoms, comes as something of a shock to our national pride when we remember that in the most important oyster region in the world, within a short distance of the Capital of the United States, the vital principles of oyster culture are ignored and efforts to apply them are resisted sometimes by force of arms. The cultivation of oysters has reached greatest perfection in the Inland Sea near Hiroshima, and some very ingenious methods have there been evolved, which are described in a paper by Dr. Bashford Dean recently published by the U. S. Bureau of Fisheries.

JAPAN IS THE ONLY COMPETITOR OF THE UNITED STATES IN THE CULTIVATION OF THE SALMON

Among the fishes regularly cultivated are the eel, the mullet, the carp, the goldfish, and several salmon and trout. The important salmon fishery in northern Japan having suffered from deple-

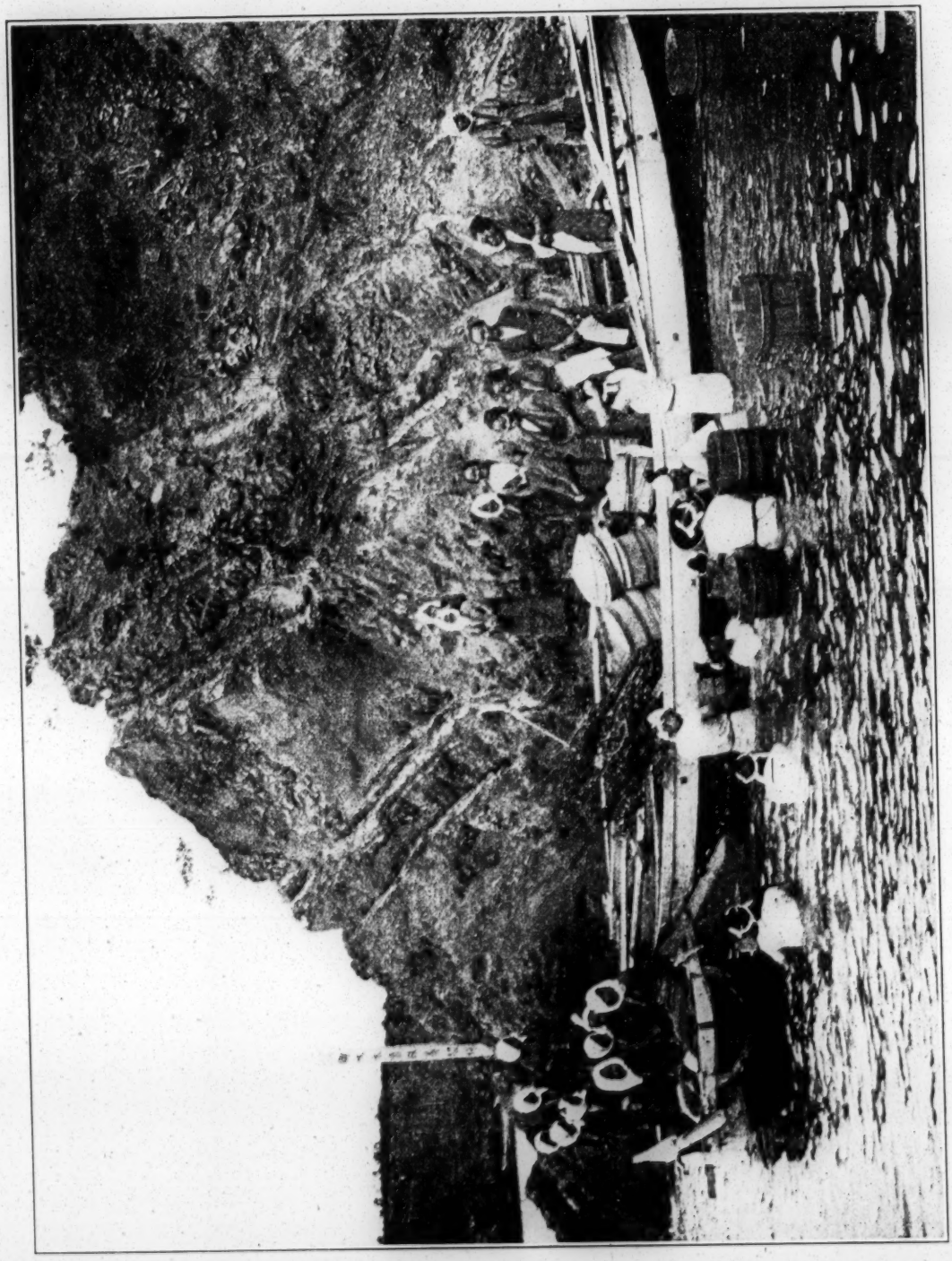


Photo by Hugh M. Smith

Women Divers, Province of Shima

tion of the streams, the government sent a representative to this country twenty years ago to study our hatching methods. It goes without saying that he took home with him a well-filled note book, and, in addition, the plans of one of our salmon hatcheries, and shortly afterwards from those plans built in Hokkaido the first salmon hatchery in Asia. With this as a model and center, salmon culture in Japan has steadily grown, until there are now eighteen salmon hatcheries in Honshu and Hokkaido, and Japan has become the only competitor of the United States in the artificial propagation of salmon.

The carp has been cultivated from very ancient times and now receives much attention. In the Tokyo district alone 225 acres of ponds are devoted to carp culture, and the annual crop is upward of 400,000 pounds, valued at $15,000. In one village in the Gifu prefecture 250 acres of paddy fields, in which there is growing rice, have recently been devoted to carp culture by the local agricultural society, and 25,000,000 young fish are now procured there annually and sold for stocking purposes. It is a significant fact that the carp not only does not injure the rice plants, but benefits them by devouring destructive insects, whereas in this country one of the very loudest and longest wails against the carp is that it uproots aquatic vegetation.

GOLDFISH FARMS

The goldfish receives more attention than any other species, and the place it holds in the affections of the masses illustrates one of the racial characteristics of the Japanese—namely, the love for the beautiful and ornamental, and the time and money all classes bestow on things that appeal to the esthetic rather than to the mercenary and practical. Although the goldfish occurs in a wild state in Japan, it is probable that China some 400 years ago furnished the stock from which the wonderful varieties of Japanese goldfish have been bred. It is reported that in feudal days, even when famine was abroad in the land and many people were starving, the trade in goldfish was flourishing. The demand at present appears to be without limit, and the output shows a substantial increase each year. Many thousands of people make a living by growing goldfish for market, and hundreds of peddlers carry the fish through the streets and along the country roads in wooden tubs suspended from a shoulder bar. The leading goldfish center is Koriyama, near the ancient capital city of Nara. Here are 350 independent breeding establishments, whose yearly product runs far into the millions. One farm which I visited was started 140 years ago; at first it was conducted merely for the pleasure of the owner, but it eventually became a commercial enterprise and is now very profitable. The history and methods of goldfish culture in Japan constitute a very engaging theme, not less interesting to the biologist than to the fish culturist. Some of the current American ideas of the manner in which the remarkable varieties have been produced are preposterous, and evoked much merriment among the Japanese when I mentioned them.

FAMOUS WOMEN DIVERS OF SHIMA

Shima, the smallest of the Japanese provinces, has been celebrated from the earliest times for its women divers, and more recently has acquired other distinctions connected with the fisheries. The divers have inherited, through many generations, an aptitude for water life which makes them veritable human ducks. The principal objects of their attention are pearl oysters, which exist in bays in all parts of Japan, but are particularly abundant in the cold clear waters of this province. The valuable pearl-oyster grounds have gradually passed under control of a

Women Divers, Province of Shima

single proprietor, who employs most of the divers. The supply of pearl oysters having been greatly reduced through overfishing during the years following the restoration, the cultivation of the species was taken up experimentally at the suggestion of Professor Mitsukuri, and has been carried to a very successful issue, the method being essentially that followed by the oyster-growers of New York and Connecticut.

ARTIFICIAL CULTIVATION OF PEARLS

Another interesting cultural enterprise has been started—also at Professor Mitsukuri's suggestion—consisting of the production of pearls by stimulating the mollusks artificially. This is brought about by inserting between the animal and its shell a small spherical nucleus of mother of pearl. This pearl-oyster farm in the Bay of Ago, not far from the famous shrines of Ise, now yields millions of pearl oysters and hundreds of thousands of natural and cultural pearls annually. Each year 250,000 to 300,000 pearl oysters are treated and then returned to the beds, where they are left for four years, so that at all times there are on hand upwards of one and a quarter millions of pearl-bearing oysters. The pearls thus produced are of fine form and beautiful luster, and are marketed in all parts of the world; their only defect is that they are broadly attached to one of the valves, and are thus only half pearls.

LARGE RETURNS FROM SEAWEEDS

A branch of the fisheries in which Japan far surpasses all other countries as regards both extent and ingenuity of method is the seaweed industry. In the United States, notwithstanding our long coast line and seaweed resources, not inferior to Japan's, the annual crop of marine vegetables is worth only $40,000, whereas in Japan these products are worth not less than $2,000,000, and are exceeded in value by only four animal products of the fisheries. Many kinds of algæ are gathered and many uses are made of them. The local consumption is enormous, and large quantities of prepared seaweeds are exported to China, Europe, and elsewhere.

Among the most valuable kinds of seaweeds are the kelps (Laminaria), which are taken in immense quantities on the more northern coasts, particularly in Hokkaido. The fishermen go out in small boats and gather the weeds from the rocks by means of long-handled wooden hooks or heavily weighted drags. The plants are spread flat on the beach to dry, and when thoroughly cured are packed in bundles and sent to manufacturers in various parts of the Empire, by whom they are prepared for market in a great variety of ways, under the general name of *kombu*. Kombu is one of the staple foods of the country, entering into the dietary of almost every family and being eaten alone as a vegetable or as a seasoning for meats, fish, stews, etc. This business has been carried on since about 1730, employs thousands of men, women, and children, and is worth from $500,000 to $1,000,000 a year.

Various algæ with soft pulpy fronds are dried by the fishermen and sold to dealers for manufacture into a kind of glue. The weeds are soaked in fresh water, made into thin, loose-meshed sheets, and rolled like Japanese matting. When ready for use such sheets are boiled in fresh water, and the pasty mess resulting is employed as a starch for clothing, in stiffening fabrics, in cementing walls and tiles, and in other ways. This business dates from about 1670, and is now conducted in over 100 establishments.

A very valuable seaweed product, and the one with which Americans and Europeans are most interested, is vegetable isinglass or agar-agar. It is made from weeds rich in gelatin by boiling them in fresh water and straining the

pulp through coarse cloths. The business began about 1760. In the early years the product was sold in bulk, but at present the entire output, for convenience in handling and using, is in two forms—slender sticks about a foot long, used locally in preparing food-jellies or exported to America and Europe for making culture media in bacteriological work, and square bars 12 to 15 inches long, which are sold largely in Holland for use in clarifying gin. The Japanese name for this product is *kanten*, meaning "cold weather," in allusion to the fact that it can be prepared only during winter, as a low temperature is necessary for the solidification of the jelly. Five hundred establishments are devoted to the manufacture of kanten, and the output in 1902 was 3,000,000 pounds, valued at $750,000. The identical alga from which the Japanese make their kanten abounds on our own coasts, but not a piece of it is now utilized.

EDIBLE SEAWEEDS

One other seaweed must be referred to, because the supply comes almost entirely from planted grounds, and in the cultivation of marine vegetables the Japanese stand alone. In all parts of the world there occurs a red alga known to British and Americans as laver, which was formerly a popular food in the British Isles and sparingly eaten in the United States. From a very remote period the Japanese have utilized this plant, and for centuries—just how long is not known—have carried on an ingenious form of cultivation. In the fall arrangements for the seaweed crop are made by sinking into the muddy bottoms of bays numerous bundles of brush or bamboo. These bundles, which are prepared on shore and taken to the grounds at low tide, are planted in regular lines, deep holes being made for them by means of an elongated conical wooden frame, with handles, which is forced into the mud by the weight of the operator. The brush intercepts and affords attachment for the seaweed spores, which grow so rapidly that by January the plants have attained their full size and the cutting of the crop begins. The plants die about the time of the vernal equinox, and the active business is at a standstill until the ensuing autumn. The best grounds for the cultivation of laver are in Tokyo Bay and are leased by the government. In 1901 the area planted with brush was 951 acres, and the value of the crop was over $148,000, or $156 an acre. In 1903 the same area yielded $300,000, or over $310 an acre. The total area of cultivated grounds in the whole of Japan is about 2,300 acres, and the value of the seaweed grown thereon is $400,000 to $500,000. About 3,500 families are engaged in this form of aquiculture. Small quantities of the laver are eaten fresh, but most of it is sun-dried before it reaches the consumer. The weeds are washed, picked, sorted, and then chopped fine by hand, and the wet, chopped pieces are spread on small bamboo mats and pressed by hand into thin sheets, the mats being placed on inclined frames in the open air. When drying is complete the sheets are stripped from the mats, piled and pressed, and tied in small bundles for market. This product has numerous culinary uses and is found in every Japanese kitchen.

GETTING SALT FROM THE SEA

An important industry in some parts of Japan, more particularly in the southern districts, is the extraction of salt from sea water, which I may be allowed to mention in connection with the fisheries. The output of mineral salt in Japan is insignificant, and the people depend almost entirely on the sea for their supply of this indispensable article. There are many thousand salt fields under cultivation, and over 100,000 people are engaged in this occupation. On the shores of the beautiful Inland Sea and on the much indented, picturesque coast of Sat-

suma I saw hundreds of these fields, which are large, perfectly flat areas, near the sea-level, with a firm, clean, sandy surface and intersected by narrow drains or ditches, in which the tide flows. Water from these ditches is freely sprinkled by hand over the floor, and, in order to promote evaporation, the wet sand is stirred and raked with a kind of harrow. The sprinkling, stirring, and drying of the sand continue until it can take up no more salt; it is then scraped into piles with a long piece of plank drawn by a workman by means of a rope brought over his shoulder, and placed in peculiar bins, of which each field has many, arranged in regular rows. The sand is then thoroughly washed with sea water, and the highly concentrated brine resulting drains into vats beneath the bins. From the vats the brine is poured into a sluice or flume and conveyed to large reservoirs under cover. As required, it is poured on huge flat iron trays, under which is a hot fire, and the water is driven off by boiling.

The fisheries of Japan are already of vast extent and are exceeded in money value by those of only two countries. There is no other country from which western nations may learn more of practical utility about many branches of the fishing industry, and there is none the study of whose cultural enterprises, governmental relations, and organization and fishery legislation and history will prove more profitable. We cannot foretell what developments the present generation or the next may see, but events are moving so swiftly in the Sunrise Kingdom, the entire business life is responding so quickly to the pace set by the twentieth century, that, whatever the outcome of the present war, the general commercial and industrial progress will undoubtedly be imparted to the fisheries and will be likely to place the money value of the industry above that of all other nations.

A CHAPTER FROM JAPANESE HISTORY*

By Eki Hioki

First Secretary of the Japanese Legation

IT affords me great pleasure to have this opportunity of addressing a gathering of such distinguished gentlemen. It gives me special pleasure to do so tonight, because this very day, the 21st of February, 1905, is the fiftieth anniversary of the exchange of the ratifications of the first treaty between Japan and the United States—the first treaty that Japan had ever concluded with any nation of the West.

THE DIPLOMACY OF COMMODORE PERRY

You should be proud of the wonderful skill in diplomacy displayed by your first envoy to Japan, our honored Commodore Perry, and the brilliant success which was achieved by him in inducing a nation, which had so long cherished the policy of seclusion and exclusion, to enter into treaty relations with the powers of the world, the accomplishment of which was brought about without the shedding of a drop of blood or even the happening of a single incident which could now revive any unpleasant memories. I am often led to reason, rightly or wrongly, that when an act of a man is founded on truth and kindness there is no need of the help of language to communicate it to others.

* An address delivered at Washington February 13, 1905

The conduct of the first American envoy to Japan, as well as those who followed him, was singularly marked with truth and kindness, and it is gratifying, indeed, to know that the annals of the five decades of international relations between Japan and the United States are clean records of friendliness and cordiality. In this connection it is pertinent to quote from the writer of a little volume called "Agitated Japan," who commenced his work with the following words:

"Without the least taint of flattery it may be safely asserted that Japan is indebted to no other country so much as to the United States. This indebtedness began on her first trial of that international intercourse which she has kept up ever since, and will doubtlessly continue as long as the world shall last. It is an undeniable fact that the honor of having opened the hitherto secluded Empire of Japan to foreign intercourse, commercial and otherwise, rests with the United States."

THE JAPANESE APPRECIATION OF WHAT PERRY DID

On July 14, 1901, a monument was erected in memory of our revered Commodore Perry at the spot where he held his first conference with the Japanese authorities. It bears an inscription composed by Marquis Ito, the most prominent of our living statesmen, recognizing in appropriate terms the services of that gallant sailor and shrewd diplomatist. On the occasion of the dedication of the monument the chairman of the committee in charge said in his address: "It was at this spot that the modern civilization of our Empire had its beginning. . . . When Commodore Perry set his foot on this shore the Japanese Empire was enshrouded in the fogs of a seclusion of nearly three hundred years. . . . This monument is erected to preserve in stone our determination never to forget the friendship of the United States that sent Commodore Perry to induce us in a peaceful way to have intercourse with foreign powers."

Such is the memory that the Japanese of today cherish. Indeed, the more we study the magnitude of the transformation that Japan has undergone since the advent of Perry, the higher becomes our appreciation of his work and the part played by the United States in regard to Japan. If the country had been forced open by any means but peaceful, nobody knows where that little Empire would stand today. Were it not for the policy the United States patiently and firmly pursued toward the upbuilding of new Japan, it is impossible to realize what progress she would have made. I am happy to acknowledge frankly our sense of indebtedness to you, and I am proud to say that your kind assistance was not in vain. In fact, these remarks might not have been quite pertinent to the subject chosen for the speech of this evening, but this very day being the fiftieth anniversary of such a memorable event in the history of the international relations of the two countries, it would not have been proper had I not paid my feeble tribute to the noble deeds of your countrymen.

THE RESTORATION

The subject of my speech for this evening is "A chapter from the Japanese history," and the chapter I refer to is the one which deals with the history of the restoration consummated in the year 1868. It is impossible, however, to treat the subject thoroughly and comprehensively within the limit of time which, in my judgment, would be endurable to my audience. I shall therefore confine what I have to say to the main course of events which resulted in the so-called "restoration."

The term "restoration" in the modern history of Japan means the reinstating of the political powers to the *de jure*

sovereign of Japan, the Mikado, which had been taken away from him for a period of 682 years (1186–1868) and which had been wielded by the *de facto* sovereign, the shogun or the military government. The history of Japan dates back 2,565 years, exclusive of the ages of gods, when our first Emperor, Jimmu, laid the foundations of the Empire, and our august ruler of today is the 121st of the Emperors descended from the direct and unbroken line of the Imperial family.

Even prior to 1186 the powers of the Mikados had, in a large measure, passed into the hands of the Fujira family, but at that period Yoritomo, a military man of great ability, founded the shogunate or military government for the first time in Japanese history, whereby he practically usurped the political powers of the Mikado and substituted his rule for that of the legitimate sovereign. It was an incidental consequence of one of the phases of human history. In Japan, as in other feudal countries, there had been an alternate tendency toward strong and weak central governments. In order to maintain peace and order and to preserve the nation as a compact unit against a strong tendency toward decentralization which was then prevailing, Yoritomo had fought a series of bloody battles with local chieftains and magnates, and finally succeeded in establishing a vigorously centralized military government over the whole Empire and by the side of that of Mikado. This was the beginning of the dual government in Japan which so much perplexed the westerners at the beginning of the foreign intercourse.

The letters of credence which the President of the United States addressed to the Emperor of Japan were handed over by Commodore Perry to the shogun of the time, and when Townsend Harris, the first United States minister to Japan, was told by the shogun that the treaty required the approval of the Mikado he was astounded. Since the establishment of the first shogunate by Yoritomo, in 1186, down to the fall of the Tokugawa shogunate, in 1868, all real power, civil and military, had passed entirely from the hands of the Mikados, they themselves being allowed to retain only an outward semblance of authority. It was remarkable, however, that through the period of nearly seven centuries when the military government was in predominance no one ever disputed the legality of the Imperial authority. On the contrary, all the shoguns formally recognized that authority by obtaining the Imperial sanction for the appointment of each successor to the shogunate government, as well as in other matters.

It was in 1868 that this *de jure* sovereignty of Japan was restored to full authority after the nominal existence of seven centuries. The manner in which it was brought about is almost unique in the annals of mankind, but what made it more remarkable was the inauguration of a new policy so radically different from what had existed before in Japan, upon which the foundation of New Japan was firmly laid down.

THE FEUDAL SYSTEM OF JAPAN IN 1868

In order to realize the real magnitude of the dramatic period of Japanese history it is necessary to know something of the political regime that existed in Japan at the time of the restoration. Roughly speaking, Japan, under the Tokugawa government, had a feudal system with 276 daimios or feudal barons. These barons had their own respective dominions, and within them they wielded an autocratic power, without any restrictions outside of a certain sort of supervision exercised by and a certain homage paid to the chief baron or shogun. The size of the dominions, the revenues and expenditures, the number of the vassals or retainers, called Samurai or military class, the barons possessed differed ac-

cording to the rank and influence they enjoyed at the time. Under the feudal system the people were divided into four classes, viz., Samurai, or military class, farmers, tradesmen, and merchants. Of these the Samurai was the privileged class, which was maintained at the public expense of each feudal lord, and it was in the hands of this class that the political activities of Japan found their home.

The feudatories, with the assistance of the retainers or Samurai (who numbered some 400,000 men, and, with their families, 2,000,000 people in the whole Empire), formed the bone and sinew of the nation at that time. While, in the latter part of the Tokugawa government, education was diffused more widely among the farmers, tradesmen, and merchant classes and their social status gained some elevation, yet they remained the class of producers for the support of a government in which they had no voice.

In a word, Japan, under the feudal system, can be considered as having been divided into so many states with complete political autonomy within the respective domains of the feudatories as to legislative, administrative, judicial, and military affairs. Every institution was in its nature local and heterogeneous. There existed no single system of law or finance that was common to the nation.

WHAT THE VOLUNTARY SURRENDER OF PRIVILEGES BY THE SAMURAI MEANT

The restoration of the Imperial power meant the unification of the governmental powers, and the unification of the governmental powers meant the surrender of the powers, rights, privileges, properties, and what-not possessed by the feudatories and Samurai, because, without a complete abdication by the feudal lords and vassals of their prerogatives, a real unification of the governmental powers and the restoration of the Imperial authority was impossible. This meant to the feudal lords the surrender of that exalted position which resembled that of an independent potentate, and taking rank not only among their former vassals, but even with the tradesmen and merchants, who, in their eyes, had no place in the political and social existence of Japan. This abandonment of the high position involved the surrender of the landed property which had been inherited from time immemorial. The surrender of the prerogatives and property by the feudal chiefs meant in the case of the Samurai, a class in whose hands the real political power of the nation rested, the loss of the very means of subsistence to the 2,000,000 of the cream of the population of the nation; it meant the dispossession of their military employment, the privilege of wearing a sword, the mark of a gentleman, the cherished pride of this class; it meant to them that they had to throw away all that distinguished this order from time immemorial and to step down into the company of the peasant or the merchant and to join the ranks of common bread-winners, whom they despised; and what was the most marvelous aspect of the situation was that this grand *coup d'etat* could be carried out only by the efforts of those who had to suffer the consequences of the change.

JAPAN IS TODAY MORE DEMOCRATIC THAN THE MOST DEMOCRATIC OF EUROPEAN NATIONS

And yet it was done. Japan of today is perhaps more democratic in its institutions than the most democratic of European nations. Although the descendants of the old Samurai still retain their ancient class name, it has only a historic value in the political and social life of Japan of today. The spirit of equality, liberty, and fraternity pervades the institutions of Japan.

It is almost beyond human power to fully comprehend this most dramatic incident in history, which resulted in

the surrender of fiefs to the Mikado. No annals of mankind record an incident which appears more inconsistent with the course that human experience would have predicted. Many explanations have been attempted. The weakened condition of the Tokugawa government, selfish motives of some ambitious southern Daimios, personal motives of various kinds, the inability of appreciating the real consequences of the change on the part of the Daimios and Samurai, are mentioned among the causes. I do not hesitate to say, however, that such a grand achievement in human history cannot be caused by such petty and selfish motives. It was solely and entirely due to the lofty spirit of patriotism and loyalty which found ready echo for action in the spirit of self-sacrifice nurtured for centuries under the rigid feudal system.

From the following words of Captain Brinkley, an eminent authority on Japanese history, you will get some idea of the spirit of self-sacrifice: "It had so long been the bushi's habit to associate great deeds with some form of self-immolation that he had learned to regard the latter as a kind of finger-post to the former. History shows that the romantic element occupies a prominent place in Japanese character, and that the educated classes can always be led into feverish pursuit of an idea which appeals to their sense of moral nobility. The atmosphere was full of loyalty and patriotism in 1869. The mood of the nation was exalted. Any one hesitating for plainly selfish reasons to follow a course apparently essential to the new order of things, and sanctioned by the example of the great southern clans, would have seemed to forfeit the right of calling himself a Samurai."

THE IMMEDIATE CAUSE OF THE SAMURAI'S SELF-SACRIFICE

Such was the spirit of the people of the time in whose hands rested the destiny of the Empire. But what was the immediate cause which called forth such a marvelous display of the extreme degree of self-sacrifice? It was the advent of black ships to the coast of Japan. It is true that the long peaceful reign of the Tokugawa government resulted in undermining its strength and power, which infused into some ambitious feudal barons the spirit of revolution. It is true that toward the end of that government the spirit of loyalty to the throne received an impetus from the advocates of the Imperial authority, but were it not for the appearance of the black ships of the various western nations along the coast of Japan and the pressure brought upon her by those powers Japan would never have seen the day of restoration.

Long before the formal opening of the country to the world at large a certain sort of intercourse was established with the Dutch, who had been permitted to reside at Deshima, a little island lying near Nagasaki. Through the Dutch settlers the glimpse of the West was being introduced into Japan in a certain measure. What overawed the people of Japan the most at the time were the black ships which moved about on the surface of the water as freely as would a wagon on land, emitting big volumes of black smoke and raising hideous noises. It was a marvel to them that these sailing ships with triangular sails could go against the head wind. Through the Dutch they heard of the greatness of England and France. The Russian fleet made occasional appearances in the northern islands, perpetrated havoc among the inhabitants, and left letters of threat. The following extract from Mr Aston's article on "Russian Descents on Japan" is interesting in this connection:

AN EARLY VISIT FROM RUSSIA

"From Ruitaka the Russians crossed over to Rushin, a small island near the

entrance to Soya (Japanese) harbor. Here they found four junks, mostly laden with stores for the Soya garrison. These junks they rifled and burnt, carrying off, amongst other booty, a ten-pounder bronze cannon captured by Taikosama from the Koreans. The officers in charge of the junks reported to their government that they had been wrecked in the storm at Rushin. The Russians sent ashore the prisoners taken at Kushunkotan and Itorup. To one of them was entrusted a message to the Japanese authorities, which was taken down in Japanese and ran as follows:

"'*To the Governor of Matsumaye:*

"'The distance between Russia and Japan being but small, our Emperor sent his officers across the sea to request that trade between the two countries might be permitted. If due inquiry had been made and a treaty of commerce concluded, all would have been well, but although our officers went repeatedly to Nagasaki they were sent away without an answer. Then things took an unpleasant turn, and our Emperor commanded us to give you a specimen of his power in return for your refusing to listen to his first request. If you persist in refusing his offers, we will take all your northern territory from you, and if possible get an answer out of you in that way. The red men (Russians) can always come to Saghalien and Itorup and chase you about. If you comply with our wishes, we shall always be good friends with you. If not, we will come again with more ships and behave in the same way as we have done before this year.

"'OROSHIYA (RUSSIA).'"

About the time when Commodore Perry entered the waters of Japan, in March, 1853, and his return there, in February, 1854, the rumors of trouble between the Chinese and European powers were being constantly received through the Dutch by the statesmen of Japan with the greatest concern. The incessant and increasing visits of the black ships and the persistent demands of the various powers to open the country to the intercourse of the world deeply occupied the minds of the thinking population of Japan. They never had those awe-inspiring black ships on their side, nor had they any of those magical sailing ships which could steer their way against the head wind. They never heard before such a tremendous roaring of cannon as that sounded on those monster vessels. The years following the conclusion of the first international treaty of Japan, in 1854, are marked with the tremendous agitation over all the Empire, and the question of national defense was a matter of paramount importance.

The Tokugawa government, by the pressure so tactfully brought upon them and by the persuasion so skillfully administered by the American envoy, were finally compelled to accede to his demands, but public opinion was strongly opposed to the opening of the country. It is impossible to say whether those people who advocated the policy of exclusion really believed in its practicability or not, but it was a policy which had been followed during several centuries, and they cherished the quiet peace of seclusion. "Respect the throne and expel the barbarians" was the byword by which public opinion was guided. The pressure of public opinion and the difficulty of the situation compelled the Tokugawa government to openly recognize the authority of the Emperor and the Imperial court, around which now thronged the Samurai of the great and ambitious clans of Satsuma and Choshiu, and, further, to submit the treaty to the Emperor and refer the same to public discussion by the Daimios. It was an act which found no precedence in the history of the Tokugawa government. Both the Emperor and the Daimios vetoed the action of the Tokugawa government.

THE MARTYRDOM OF LORD II

Heavy as they felt the foreign pressure on one hand, the Tokugawa government could not ratify the American treaty on account of the strong internal opposition. There appeared a martyr in the person of Ii Kamon-no-Kami, who assumed the portfolio of the premier of the Tokugawa government at this critical moment, and who, in defiance of the Imperial order and the public opinion, ratified that American treaty. He was a real martyr, because soon after he fell by the hands of assassins, being regarded by the opposition as a traitor to the country. Whatever might have been the popular verdict upon his conduct at the time, it is clear now that he acted in that spirit, as is explained in the following poem of his own:

"As beats the ceaseless wave
On Omi's strand
So breaks my heart for my beloved land."

Agitation was intensified by this daring act of Lord Ii. A revolution followed, and the Tokugawa shogunate, which prospered during two centuries and a half, and under whose wise and peaceful administration the arts of peace made such advances as to have surprised the world, finally came to an end, and the present Emperor, Mutsuhito, was proclaimed on the 27th of March 1867, as the sole and absolute ruler of Japan. At the same time the feudal system, which was originated seven centuries ago, was blotted out from the pages of Japanese history by the voluntary surrender by the shogun and Daimios of all the rights, privileges, and properties descended from their illustrious ancestors or earned by their own distinguished exploits. This noble deed, which involved such an enormous sacrifice, was entirely due to the public spirit of the men who had been convinced by the turn of events that the only way of defending the country against the external aggression was to bring about the unification of the administration and centralization of power—a condition which was possible only on the absolute abolition of the regime then existent.

THE OATH OF ACCESSION

The Emperor, on his accession to the throne, proclaimed the following articles of oath, thus solemnly laying the foundation for the grand policy of new Japan:

"1. A broadly based deliberative assembly should be convened for the purpose of conducting state affairs in conformity with public opinion.

"2. High and low should unite their minds and vigorously carry out the grand affairs of the state.

"3. Civilians and military, as well as common people, should be allowed to freely carry out their minds' aspirations, and their spirit of progress should not be suffered to be hampered.

"4. Cast off the uncivilized customs of the past and let us found our principles on the laws of nature.

"5. Seek knowledge in the world and strengthen the foundation of the Empire.

"Desiring to introduce the reforms unparalleled in the history we, ahead of all our subjects, took the oath before the gods of heaven and earth and solemnly established the fundamental policy for the Empire and endeavor to lay the foundation for the way of promoting the happiness and prosperity of the people. You should likewise share the same principle and coöperate with us."

CHAOS FOR A TIME

The tasks attendant to the consummation of this grand revolution, which shook to the heart the political and social organizations of the country, taxed the wisdom, energy, forbearance, and self-sacrifice of the patriots of Japan in a manner almost unknown in the history of mankind. An anti-foreign, con-

servative, anarchistic, and destructive spirit pervaded all classes of the people. The Samurai of different Daimios severed their allegiance with their former lords in order to carry out their own conviction by the use of swords and violent means. Misunderstandings, jealousies, and intrigues were rampant, and assassinations were of common occurrence. In a word, the whole Empire was in a state of chaos. To tame these unruly elements, to infuse order and harmony among them, and to graft on them an order and regime entirely foreign to the soil, and to develop them to the condition in which they are now within the short space of the last 37 years is the grandest of the achievements that man has ever accomplished.

SOME OF THE PROMOTERS OF THE GREAT CHANGE

The men who conceived and achieved this unique revolution were chiefly Samurai of inferior grade, without official rank or social standing. The most prominent of them do not exceed 55 in number, and among them only 13 are aristocrats; but these latter played only a secondary part in the movement, with the exception of Sanjo and Iwakura. The other 42 men were all young Samurai. The average age of the 55 men did not exceed 30 years.

The four great clans of southern Japan—Satsuma, Choshiu, Tosa, and Hizen—promoted the revolution, and the prominent persons of the present era came chiefly from the Samurai of these four clans, and more particularly from those of Satsuma and Choshiu. Many great statesmen of this period have already departed from this world, but such names as Saigo, Okubo, Kido, Iwakura, and Sanjo cannot justly be passed over without mention. Still alive and actively taking part in the affairs of state are Marquis Ito, who was one of the younger members among the promoters of the revolution and a statesman of the greatest constructive genius of the Meiji era, whose name is connected with nearly every great work in the history of new Japan, and whose legislative career is crowned by the drafting of the constitution; Marquis Yamagata, to whom the nation is indebted for the organization of the efficient army now fighting in Manchuria and to whom was entrusted the chief command of the Imperial army against China in 1894; Marquis Oyama, a most genial, loyal, and brave general and statesman, now leading the Imperial army in Manchuria; Count Inouye, a resourceful, undaunted, strong-willed statesman, who held the portfolio of foreign affairs for nearly ten years at the most troublous time of Japan's foreign relations; Count Matsugata, an eminent financier, whose name has covered the title page of the history of the gold-standard system of Japan; Count Okuma, now leader of the progressive party and a politician of the most subtle, versatile, and vigorous intellect; Count Itagaki, formerly leader of the liberal party and the most ardent advocate of the constitutional government. The careers of these men are full of incidents most entertaining and instructive, but I have no time to dwell upon them here.

HIS MAJESTY THE EMPEROR MUTSUHITO

It would be improper to close this speech without some allusion to our most beloved and revered sovereign, who was suddenly called to the actual duties of the head of the nation at the age of sixteen and at the most turbulent period in Japan's history. During the last thirty-seven years of his most marked and enlightened reign he has given the nation the enjoyment of all the best fruits of the civilization of the West, and, above all, has raised the country, in the face of the immense obstacles, from the position of an insignificant oriental state to that of a formid-

able unit in the comity of nations. Much need not be said about his public acts. Facts are too abundant and conspicuous to make explanation necessary.

His Majesty the Emperor Mutsuhito was born on the 3d of November, 1852, and ascended the throne in February, 1867. He is a person above the ordinary Japanese height, with large, wide-set eyes and broad forehead. He is robust in health, studious in habit, kind and sympathetic in sentiment, and strong and loyal in character. Out of the civil list, which is only $1,500,000 a year, he supports, borrowing the words of Captain Brinkley, "the whole of the princely families, including that of the Crown Prince; he accompanies all patents of nobility with handsome sums; he makes liberal allowances to cabinet ministers by way of supplement to their salaries; he pays the honoraria that goes with orders and medals; he gives large amounts to charitable purposes, many of which escape the public attention altogether, and he devotes considerable sums to the encouragement of art." The $65,000 which were given for the entertainment of the soldiers on the 11th of February last, the occasion of the anniversary of the foundation of the Empire by the first Emperor, Jimmu, came out of the Imperial purse. "His manner of life is simple and frugal, and it may be truly said that his record does not show one act unworthy of the reverence with which his subjects regard him." Indeed, the people of Japan love, honor, and respect His Majesty, who has so faithfully and assiduously fulfilled the oath which he took on his accession to the throne.

I have heard sometimes certain sarcastic remarks on the reports to the Emperor from the generals and admirals on the field, which generally end with the phrase "This glorious success is due to the virtue of your Majesty." To your ears this may sound strange. Foreigners may take it as a mere form of oriental flattery; but to our mind there is nothing more truthful and sincere. In Japan loyalty and patriotism are interchangeable terms. Were it not for the devotion of men and officers to "Our Lord and country," no admiral or general, however great a military genius he may be, could ever achieve the glorious successes which crowned their efforts during the present war.

The sentiment expressed in our national hymn that

> "May our Lord's dominion last
> Till a thousand years have passed
> Twice four thousand times o'ertold.
> Firm as changeless rock, earth-rooted,
> Moss of ages uncomputed,"

truthfully reflects the hearts' wishes of the fifty millions of his most loyal subjects.

OUR SMALLEST POSSESSION—GUAM

By William E. Safford

Mr Safford was formerly a lieutenant in the U. S. Navy, and his cruises took him to many of the islands of the Pacific, where he made many notes and collections. He so felt the want of a handy volume describing the luxuriant tropical plants, a large number of which are very useful, that when he later joined the botanical staff of the Department of Agriculture he resolved to write a book on the subject. This book, a volume of 420 pages, profusely illustrated, and with an introduction by Mr Frederick V. Coville, Curator of Botany, has just been published by the U. S. National Museum under the title "The Useful Plants of the Island of Guam." In it the author describes the principal plants used for food, fiber, oil, starch, sugar, and forage in our tropical islands, and he further includes much interesting information about the people of Guam and their descendants. The following article is based on this report:

GUAM is considerably larger than Tutuila, the most important of the Samoan Islands owned by the United States, though its chief port, San Luis de Apra, cannot be compared with Pango-Pango, our naval station in the South Pacific, and perhaps the finest harbor in the world. The advantage of Guam as a station for repairs and supplies is evident, forming, as it does, a stopping place for vessels between Hawaii and the Philippines. Its strategic importance has been greatly enhanced since it has been made the landing place of the trans-Pacific cable, and the completion of the Panama Canal will make it still more valuable to our government.

The extreme length of the island from north-northeast to south-southwest is 29 statute miles. Its width is from 7 to 9 miles, narrowing at the middle to a neck only 4 miles across. On the northwest coast of this neck is situated Agana, the capital, a city of over 6,000 inhabitants. The entire population of the island, according to the census of 1901, was 9,676.

THE COMING OF MAGELLAN

The Island of Guam was discovered on March 6, 1521, by Magellan, after a passage of three months and twenty days from the strait which bears his name. An account of the privations and suffering of his crew, many of whom died on the way across the hitherto unexplored ocean, is graphically given by Antonio Pigafetta, Magellan's historian. He describes how the expedition arrived at Guam with the crews suffering from scurvy and in a starving condition, having been compelled on the passage to eat rats and even the leather from off the standing rigging to keep soul and body together. In comparison with Magellan's feat of crossing the vast Pacific, the first voyage of Columbus from the Canary Islands to the West Indies seems insignificant. The natives of Guam came to meet the Spaniards in strange "flying praos" (canoes provided with outriggers and triangular sails of mats). The Spaniards had dropped anchor, furled their sails, and were about to land, when it was discovered that a small boat which rode astern of the flagship was missing. Suspecting the natives of having stolen it, Magellan himself went ashore at the head of a landing party of 40 armed men, burned 40 or 50 houses and many boats, and killed seven or eight natives, male and female. He then returned to his ship with the missing boat and immediately set sail, continuing his course to the westward.

The natives did not fare much better at the hands of later visitors. Missionaries came in 1668.

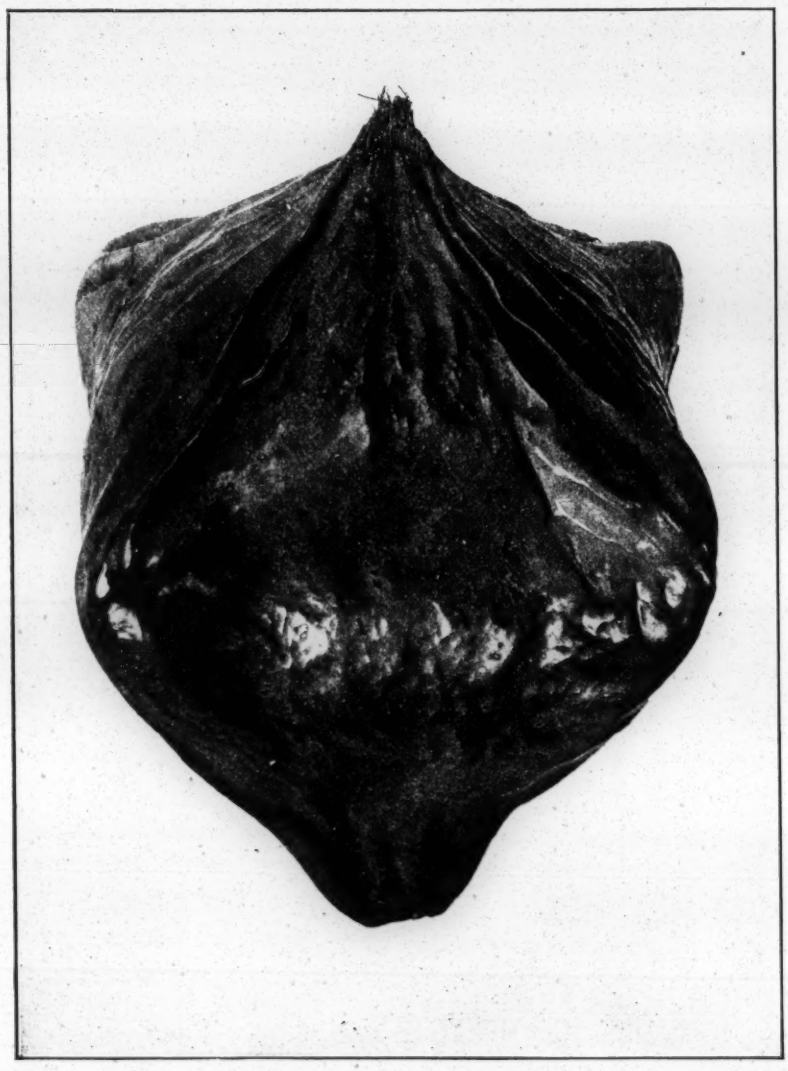
From W. E. Safford, U. S. National Museum

The Forest, Island of Guam

Showing epiphytal vegetation (airplants which grow on other plants but do not derive their nourishment from them). The young carabao is carrying water in bamboo water jugs.

From W. E. Safford, U. S. National Museum

On the Main Road Across the Island of Guam



A Fish Intoxicant ; the Fruit of the *Barringtonia speciosa*, Natural Size

The natives of Guam, and of a number of other tropical islands of the Pacific, use this fruit to stupefy fish (see opposite page). The species does not occur in the Hawaiian Islands, but it is found in the Malay Archipelago, the Andaman Islands, and Ceylon. The fruits are light, and as the tree grows down to the very edge of the sea, they often fall into the water and are carried by currents and cast upon other shores. The dried fruits are used by the natives as floats for their nets.

Though Guam lies within the tropics, its climate is tempered throughout the greater part of the year by a brisk trade wind blowing from the northeast and east. Its mountains are not high enough to cause marked differences in the distribution of rain on the island, and the island is not of sufficient extent to cause the daily alternating currents of air known as land and sea breezes. Generally speaking, the seasons conform in a measure with those of Manila, the least rain falling in the colder months or the periods called winter by the natives, and the greater rainfall occurring in the warm months, which are called summer by the natives.

The mean annual temperature is about 80° F. in December, the coldest month, to 82° F. in May and June, the hottest months. The highest absolute temperature recorded in 1902, 90° F., occurred in June and July, the lowest, 66° F., in December.

Though the mean monthly temperature varies only 2° on either side of the mean annual temperature, yet the "winters" of Guam are so definitely marked that certain wasps which during the summer make their nests in the open fields among the bushes invade the houses of the people at that season and hibernate there.

The forest vegetation of Guam consists almost entirely of strand trees, epiphytal ferns, lianas, and a few undershrubs. The majority of the species are included in what Schimper has called the Barringtonia formation. The principal trees are the wild, fertile breadfruit, *Artocarpus communis;* the Indian almond, *Terminalia catappa;* jack-in-the-box, *Hernandia peltata*, and the giant banyan.

CATCHING FISH WITH INTOXICANTS

The fruit of another common tree (*Barringtonia speciosa*) the natives use to stupefy fish.

The fruit is pounded into a paste, inclosed in a bag, and kept over night. The time of an especially low tide is selected, and bags of the pounded fruit are taken out on the reef next morning and sunk in certain deep holes in the reef. The fish soon appear at the surface, some of them lifeless, others attempting to swim, or faintly struggling with their ventral side uppermost. The natives scoop them in their hands, sometimes even diving for them. Nothing more striking could be imagined than the picture presented by the conglomeration of strange shapes and bright colors—snake-like sea eels, voracious lizard-fishes, gar-like houndfishes, with their jaws prolonged into a sharp beak; long-snouted trumpet-fishes, flounders, porcupine-fish, bristling with spines; squirrel-fishes of the brightest and most beautiful colors—scarlet, rose color and silver, and yellow and blue; parrot-fishes (Scarus), with large scales, parrot-like beaks, and intense colors, some of them a deep greenish blue, others looking as though painted with blue and pink opaque colors; variegated Chaetodons, called "sea butterflies" by the natives; trunkfishes with horns and armor, leopard-spotted groupers, hideous-looking, warty toadfishes, "*nufu*," armed with poisonous spines, much dreaded by the natives, and a black fish with a spur on its forehead.

As many young fish unfit for food are destroyed by this process, the Spanish government forbade this method of fishing, but since the American occupation of the island the practice has been revived.

In the mangrove swamps when the tide is low hundreds of little fishes with protruding eyes may be seen hopping about in the mud and climbing among the roots of the Rhizophora and Bruguiera. These are the widely spread *Periophthalmus koelreuteri*, belonging to a group of fishes interesting from the fact that their air bladder has assumed in a measure the function of lungs, enabling the animal to breathe atmospheric air.

From W. E. Safford, U. S. National Museum

A Coffee Tree in Full Bloom, Island of Guam

Every family on the island grows its own coffee

From W. E. Safford, U. S. National Museum

Betel-nut Palms

The nut is greatly esteemed by the natives of Guam, who chew it with the leaf of the betel pepper. It imparts a red color to the saliva, so that the lips and teeth appear to be covered with blood, and in time become blackened. In Guam betel chewing is a matter of etiquette at all wedding assemblies, festivals, and funerals.

THE NATIVES AS THE SPANIARDS FOUND THEM

Both sexes were expert swimmers, and were as much at ease in the water as on land. As they threw themselves into the sea and came bounding from wave to wave they reminded Pigafetta of dolphins. The men were good divers. Legazpi states that they would catch fish in their hands. The children accompanied their parents while fishing, and were so expert in the water that Garcia declared that they appeared rather fish than human beings.

According to the testimony of early writers, their houses were high and neatly made and better constructed than those of any aboriginal race hitherto discovered in the Indies. They were rectangular in shape, with walls and roofs of palm leaves curiously woven. They were made of cocoanut wood and palo maria (*Calophyllum inophyllum*), and were raised from the ground on wooden posts or pillars of stone. In one of the narratives of the Legazpi expedition it is said that some of the houses supported on stone pillars served as sleeping apartments; others built on the ground were used for cooking and other work. Besides these, there were large buildings that served as storehouses for all in common, wherein the large boats and covered canoes were kept. "These were very spacious, broad, and high, and worth seeing." As described by the missionaries, some of the houses had four rooms or compartments, with doors or curtains of mats, one serving as a sleeping-room, another as a store-room for fruits, a third for cooking, and a fourth as a workshop and boat-house.

They were a happy, careless people, fond of festivities, dancing, singing, story telling, and contests of strength and skill, yet sufficiently industrious to cultivate their fields and garden patches, build excellent houses for their families, braid mats of fine texture, and construct canoes which were the admiration of all the early navigators. They were much given to buffoonery, mockery, playing tricks, jesting, mimicry, and ridicule, offering in this respect a striking contrast to the undemonstrative Malayans.

That they were naturally kind and generous is shown by their treatment of shipwrecked sailors cast upon their shores and their reception of the early missionaries who founded the first colony on the island. These missionaries complained that they could not make the natives take life seriously, saying that what they promised one minute they forgot the next. On the other hand, the missionaries spoke of the remarkable intelligence shown by the children in learning the Christian doctrine, the moderation of the natives in eating, and the absence of intoxicants. Their sense of hospitality was very marked. Women were treated with consideration, and had greater authority than in almost any other land hitherto known.

THE PRESENT PEOPLE OF GUAM

The natives of Guam are, as a rule, of good physique and pleasing appearance. Owing to their mixed blood, their complexion varies from the white of a Caucasian to the brown of a Malay. Most of them have glossy black hair, which is either straight or slightly curly. It is worn short by the men and long by the women, either braided, coiled, or dressed after the styles prevailing in Manila.

Though the natives of Guam are naturally intelligent and quick to learn, little has been done for their education, and many of them are illiterate. The college of San Juan de Letran was founded by Queen Maria Anna of Austria, widow of Philip IV, who settled upon it an annual endowment of 3,000 pesos. Through misappropriation and dishonesty the annual income of the college gradually dwindled to about

1,000 pesos. The greater part of this was absorbed by the rector, who was usually the priest stationed at Agana, and by the running expenses of the school, which were the subsistence and wages paid to janitor, porter, steward, doctor, and the lighting of the building.

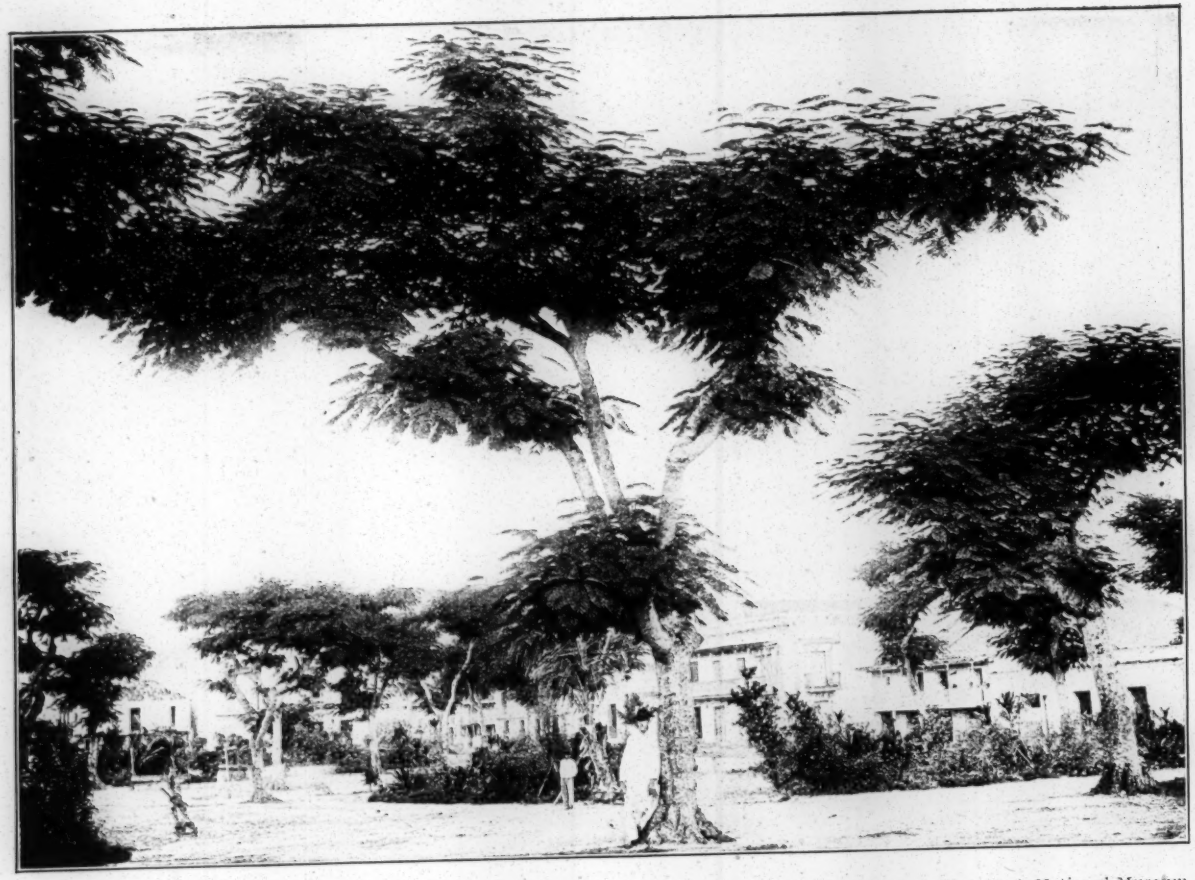
The people are essentially agricultural. There are few masters and few servants on the island. As a rule the farms are not too extensive to be cultivated by the family, all of whom, even the little children, lend a hand. Often the owners of neighboring farms work together in communal fashion, one day on A's corn, the next day on B's, and so on, laughing, singing, and skylarking at their work and stopping whenever they feel so inclined to take a drink of tuba from a bamboo vessel hanging to a neighboring cocoanut tree. Each does his share without constraint, nor will he indulge so freely in tuba as to incapacitate himself for work, for experience has taught the necessity of temperance, and every one must do his share if the services are to be reciprocal. In the evening they separate, each going to his own rancho to feed his bullock, pigs, and chickens. After a good supper they lie down for the night on a pandanus mat spread over an elastic platform of split bamboo.

None of the natives depends for his livelihood on his handiwork or on trade alone. There are men who can make shoes, tan leather, and cut stone for building purposes, but such a thing as a Chamorro shoemaker, tanner, stone mason, or merchant who supports his family by his trade is unknown. In the midst of building a stone wall the man who has consented to help do the work will probably say, "Excuse me, Señor, but I must go to my rancho for three or four days; the weeds are getting ahead of my corn." And when lime is needed the native to whom one is directed may say, "After I have finished gathering my cocoanuts for copra I will get my boys to cut wood and gather limestone to make a kiln. Never fear, Señor, you shall have your lime within six weeks." On one occasion a blacksmith was delayed two weeks in making a plow owing to the fact that the man from whom he got his charcoal had been so busy supplying visiting vessels with fruits and vegetables that he could not find time to burn it.

THE MILCH GOAT

THE Department of Agriculture has been so successful in its experiment of introducing the beautiful Angora goat into this country, by means of which an industry worth several million dollars has been created, that it is now trying to arouse an interest in the milch goat. Every traveler in Europe is familiar with the sturdy little animal, which does not hesitate to climb to the attic of a dwelling and when several stories up allow itself to be milked. It is estimated that Germany owns about 3,000,000 of these animals, that they are worth about $12,000,000, and yield milk and kids each year worth $36,000,000, or three times their original value.

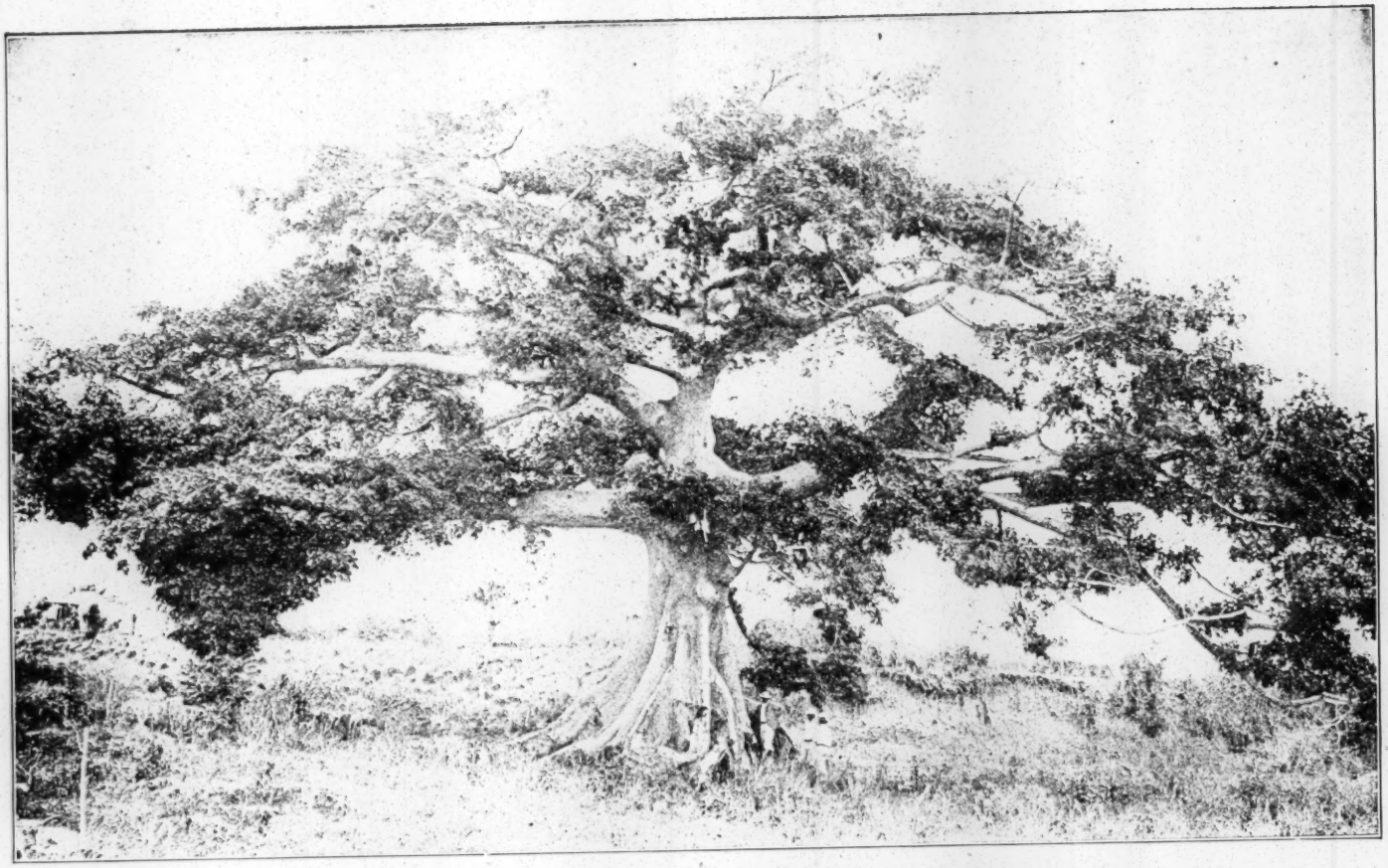
A good goat gives four or five quarts of milk daily. It can eat many kinds of herbage, so that its keep is not a difficult nor expensive problem. The milk is believed to be richer and freer of tuberculosis than cow's milk, and if kept clean is not odorous. Families living in crowded suburbs may find a solution of the milk problem in keeping milch goats.



From O. F. Cook and G. N. Collins, U. S. National Museum

Flame Tree in the Plaza Caguas, Porto Rico

This beautiful tree is a native of Madagascar, but is now used to adorn many plazas throughout the tropics. The large finely-divided leaves appear almost as delicate as maiden-hair fern fronds, while the spreading branches make it an excellent shade tree.



A Splendid Specimen of the Ceiba Tree, or "Silk Cotton," near Ponce, Porto Rico

The Porto Ricans use the cotton covering the seeds to make beds and pillows. This and the preceding illustration are from a report on "The Economic Plants of Porto Rico," by Messrs O. F. Cook and G. N. Collins, published by the U. S. National Museum. The bulletin includes about 3,000 entries of weeds, shrubs, trees, fruits, and vegetable plants which furnish some article of use.

From Henry Gannett, U. S. Geological Survey

A Group of *Sequoia gigantea*, Mariposa Grove, California

GEOGRAPHIC NOTES

NATIONAL GEOGRAPHIC SOCIETY

AT the last meeting of the National Geographic Society for 1904–'05 President Willis L. Moore announced that the membership of the Society had reached 5,000, making the National Geographic Society the largest geographical society in the world. Nearly every section of the globe is represented in this membership.

The members are reminded that the Society will always welcome from them notes of geographic development and interest. Members are also urged to send to the Society for preservation in its library copies of photographs taken by them, either at home or on their travels, that have a geographic value.

Some features which the National Geographic Society will publish in its Magazine during the next several months are:

An article on "Storms and Weather Forecasts," illustrated with 20 charts, showing storm tracks, hot and cold waves, etc., by Dr Willis L. Moore, Chief United States Weather Bureau and President of the National Geographic Society; an address on "The Philippines," by the Secretary of War, Hon. William H. Taft, with a new map of the Philippines, 23 by 36 inches and in

From George Fayette Thompson, U. S. Department of Agriculture

A Group of Milch Goats. (See page 237)

three colors; an address on "The Panama Canal," by Admiral C. M. Chester, Superintendent of the Naval Observatory; an address on "The Evolution of Russian Government," by Dr Edwin A. Grosvenor, Professor of International Law in Amherst College; an address on "The Commercial Prize of the Orient," by Hon. O. P. Austin, Chief of the Bureau of Statistics.

A series of illustrated papers on some of the principal geographic features of the United States: "The Big Horn Region of Wyoming," by N. H. Darton; "The Bad Lands," "The Yosemite," "The Great Plains," etc.

UTILIZING THE DESERT

A NEW method of making the desert useful, which may perhaps give value to millions of acres now worthless, has been suggested by Mr W. P. Spillman, Agrostologist of the Department of Agriculture.

In certain parts of Texas ranchmen have been accustomed when forage has failed because of drought to cut down the prickly pear and feed it to cattle. They remove the thorns by singeing the plants in a fire or with a plumber's gasoline torch or cut the cacti to pieces with a machine. The cactus makes an excellent food, and in some sections of southern Texas the stock industry is almost entirely dependent on it during portions of the year. Cacti grow scatteringly in many parts of the dry region, but outside of southern Texas they are found only in limited areas in sufficient abundance to be used as forage. Now Mr Spillman suggests that varieties of cacti might be planted in those parts of the United States where they now grow scatteringly, and thus possibly utilize areas in Texas, Arizona, New Mexico, California, Kansas, Idaho, Montana, Colorado, Nevada, Utah, and even as far north as Nebraska, which are now of little value.

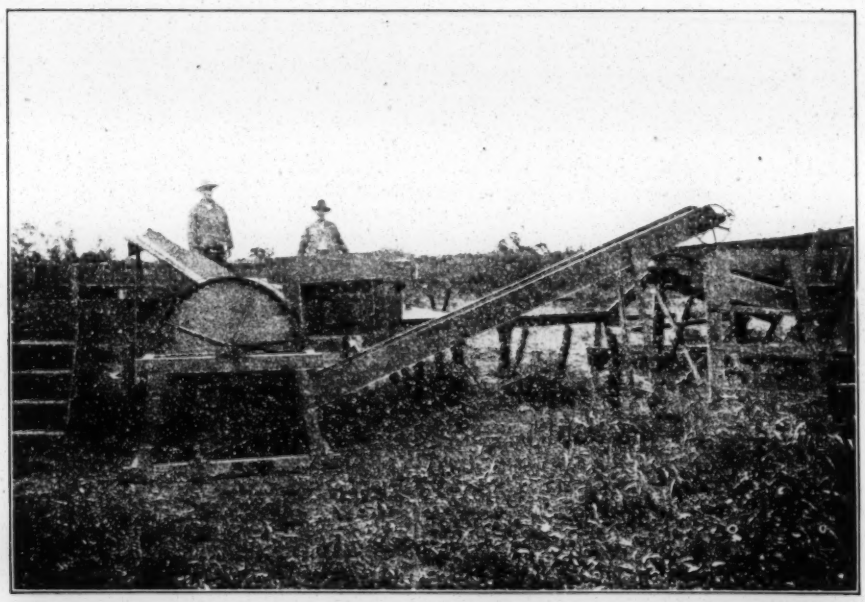
The Department of Agriculture has

From David Griffiths, Department of Agriculture

One of the Common Prickly Pears of Texas in Full Fruit

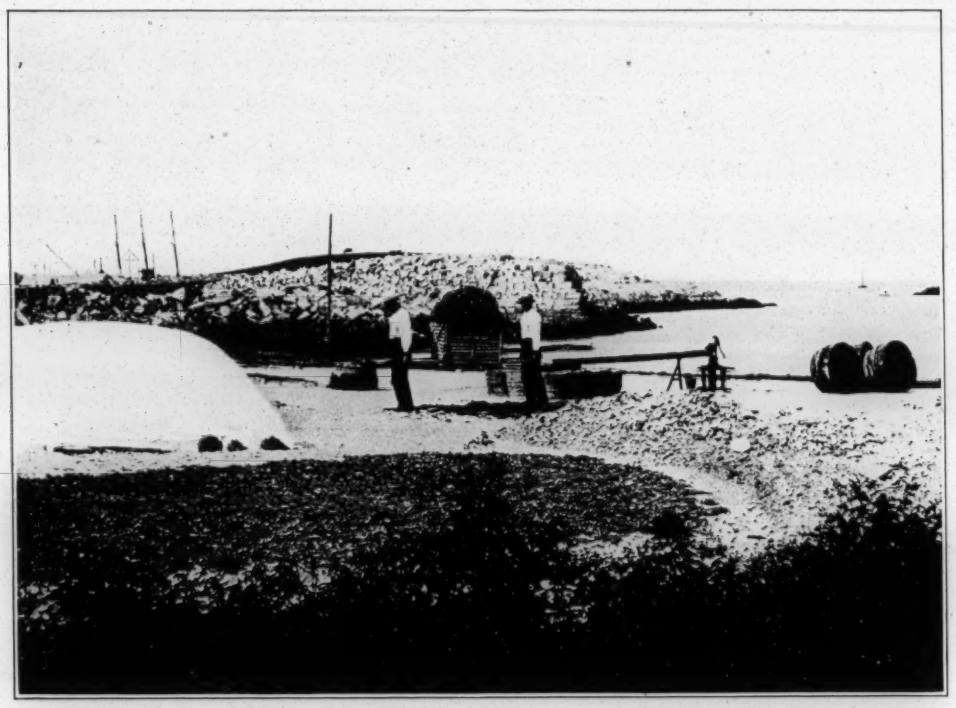
From David Griffiths, Department of Agriculture

Singeing the Prickly Pear of Texas with a Torch



From David Griffiths, Department of Agriculture

A Type of Pear Cutter, as Set Up and Operated



From Hugh M. Smith, Bureau of Fisheries

Gathering Irish Moss at Scituate, Massachusetts

published a bulletin on "The Prickly Pear and Other Cacti as Food for Stock," by David Griffiths, which contains many interesting facts on this subject. It is believed by some that the natural cactus with its long thorns would be more serviceable than the thornless cactus of Mr Burbank, as it would not need to be protected against foraging cattle.

THE SEAWEEDS OF THE UNITED STATES

WITH seaweed resources certainly not inferior to those of Japan or any other country, and probably much superior, the United States may be said practically to ignore these valuable products except at a few points on its extensive coast. Statistics recently gathered give the paltry sum of $35,000 as the value of the marine algæ prepared in the United States in one year. The business is practically restricted to Massachusetts, and is addressed to a single species, the "Irish moss" (*Chondrus crispus*). Considerable quantities of seaweeds are used as fertilizer on farms adjacent to the coast, but this is not a commercial enterprise. In Monterey and Santa Barbara counties, California, the Chinese fishermen dry certain algæ for food, medicine, and fertilizer.

GEOLOGIC FOLIOS IN SCHOOLS

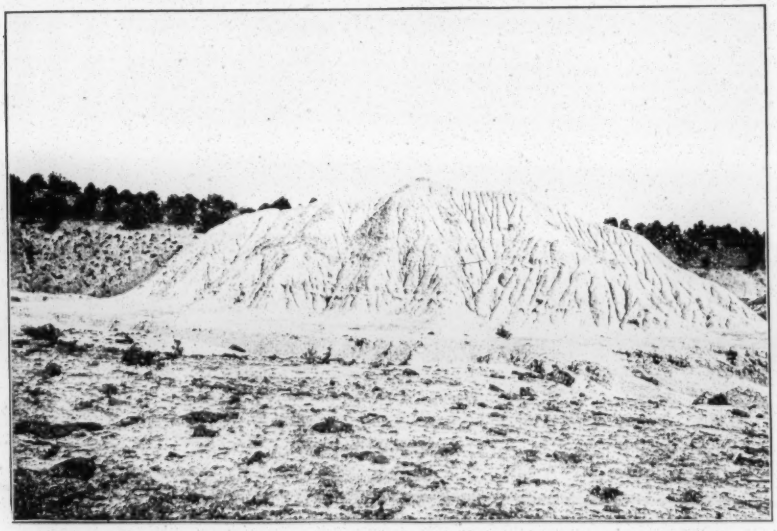
THE Germans have a study in some of their schools which they call "Heimathskunde"--the study of home. Pupils are instructed minutely in the knowledge of their immediate environ-

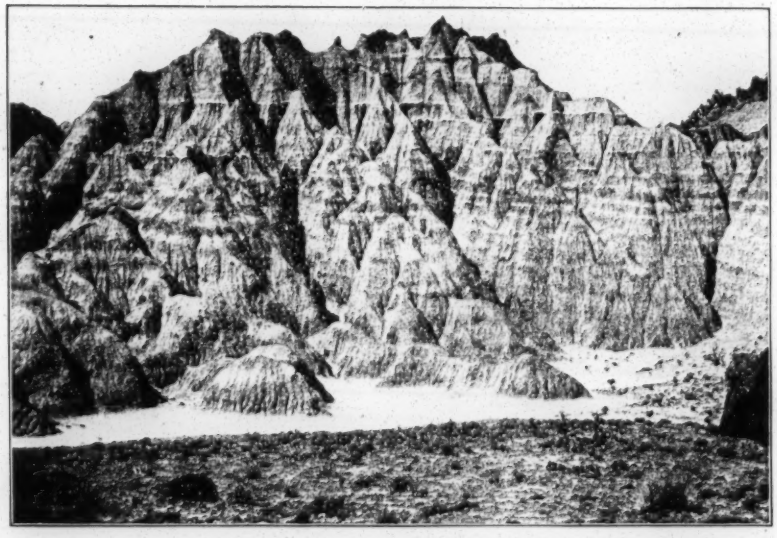
From Hugh M. Smith, Bureau of Fisheries

Bleaching and Curing Irish Moss at Scituate, Massachusetts

ment. They learn not merely the names and characteristics of the mountains that surround their native place and the streams that flow through it, but they study the special resources and industries of the locality, the city's streets, parks, museums, art galleries, water works, garbage plant fire department, etc. It is a study that makes them more enlightened citizens.

Similar studies are prosecuted in many American schools, and the American teacher has at his command a valuable aid in studying many localities, of which, unfortunately, few avail themselves. This aid consists of the separate folios of the geologic atlas of the United States which the United States Geological Survey is engaged in publishing. Each folio includes a topographic map and geologic map of a small area of country, together with explanatory and descriptive texts. Frequently these folios also contain structure section sheets and columnar section sheets, maps illustrative of the artesian water supply of the area, diagrams of coal sections, or photographic reproductions of specially interesting topographic features or of peculiar fossil types. The Survey has issued 119 geologic folios up to date. That means that teachers may have at very little cost the most complete and scientific description yet published of 119 different areas in the United States, each illustrated by the latest topographic and geologic maps. As text-books in geography, geology, and mineralogy for the limited





From Israel C. Russell, U. S. Geological Survey

Excellent Examples of Weathering near Logan Butte, Cook County, Oregon

These peculiar-shaped mounds have been carved by the action of sun and rain from soft shales. Numerous well-preserved bones of extinct mammals have been found in these beds.

area each represents, they should be highly appreciated.

To encourage the purchase of these folios for educational purposes, the Geological Survey has lately reduced the wholesale price on folios. When purchased separately, the folios of ordinary size cost 25 cents each, those of greater length cost 50 cents each, and a few of extraordinary size cost 75 cents each. The Survey now offers 34 folios of the ordinary size for $5.10, which makes the price of each copy only 15 cents. A corresponding reduction of 40 per cent is made on the wholesale price of the large folios.

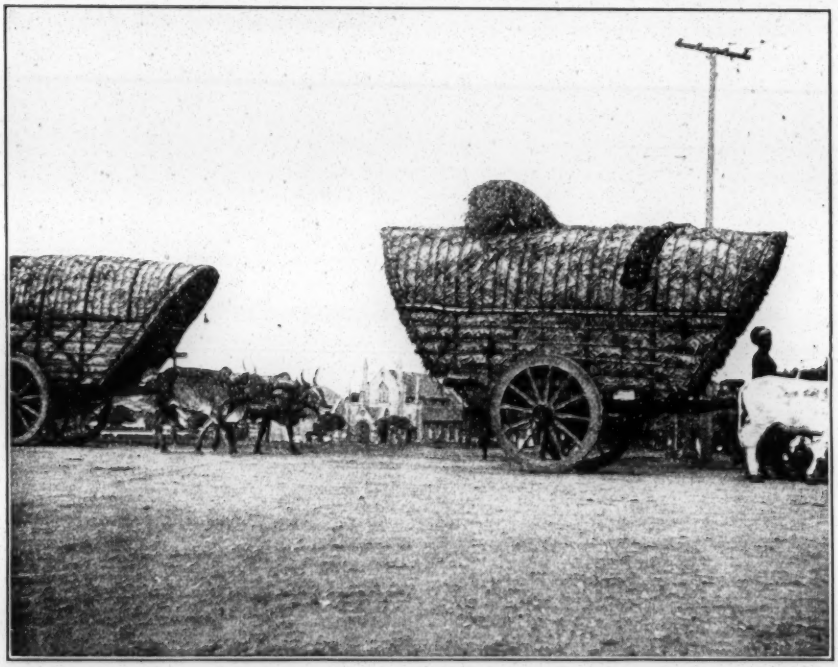
To show how reasonable is the price of these folios, when regarded as textbooks, consider the New York city folio. The retail price is 50 cents a copy. It contains 17 pages of text, 13 pages of maps (each one of which would cost 5 cents if purchased separately), and 2 pages of plates. Other cities covered by geologic folios are Washington and Chicago. One folio (No. 50, Holyoke) has been issued for the New England area. The price of each of these is 50 cents.

Those desiring information as to the areas now covered by the folios should apply to the Director of the United States Geological Survey, Washington, D. C.

Stacking Alfalfa with a Derrick on a Western Farm

From an interesting report on our great forage crops by A. S. Hitchcock, of the Department of Agriculture.

Tamil Girls Picking Tea, Ceylon



From S. A. Knapp Department of Agriculture

Carts with Bamboo Covers, Ceylon

NOTE ON THE ACTIVITY OF SHISHALDIN VOLCANO

IN March, 1903, the NATIONAL GEOGRAPHIC MAGAZINE published some striking photographs of the mountains on Unimak Island, Alaska, and gave a vivid account of the nature of Shishaldin's activity.

It will not be without interest to add some personal observations of a later date. On September 14, 1904, while in command of the Coast and Geodetic Survey steamer *McArthur* and while passing Shishaldin at a distance of from 15 to 18 miles, I made the following observations on the volcano, which was visible for several hours during the afternoon:

The volcano was seen to be in a mild state of activity. In addition to a continuous emission of dense white smoke or steam, circular rings apparently several hundred feet in diameter and of remarkable symmetry and whiteness were seen to emerge in puffs at short intervals from the very top of the mountain.

Frequently two or three of these would remain visible at the same time.

HOMER P. RITTER,
U. S. Coast and Geodetic Survey.

COTTON CULTIVATION IN THE BRITISH EMPIRE

AN interesting geographic contribution is a British blue book of last year on cotton cultivation in the British Empire and Egypt, prepared by Prof. W. Dunstan, director of the Imperial Institute at South Kensington, with the aid of his scientific staff (folio, 40 pages, map, and diagrams). He discusses, in all that broad belt from 40 degrees north to 40 degrees south, the natural conditions and past efforts for developing the cotton industry in all the British possessions that seem at all fitted by nature for growing this plant, with a brief treatment of the characteristics of cotton. He makes the fullest acknowledgment to American works on the entire industry from the seed to the finished product, and pays high tribute to the knowledge and labor of our Department of Agriculture. In fact, he considers our "paramount" position due to the operation of this branch of the government. After this comprehensive survey of the matter, he finds no hope of displacing our leadership, but the most promising territory for competition with us is in Africa, with something additional in the East and West Indies. But to any one acquainted with our cotton area it is feared that Professor Dunstan is not a safe guide. In his "sketch map of the cotton belt of the world" he actually has cotton growing in the United States up to the latitude of New York and thence straight across beyond the Mississippi River—at least double the space on which it can be possibly produced. He also has cotton in China as far north as Peking. It is most likely that such blunders arose from employing a purely bookish man to do practical work. C. M.

WATER EROSION THEORY A FALLACY

With Apologies to Prof. H. L. Fairchild *

THE arguments against the possibility of erosion by running streams may be summed up as follows:

1. No one ever saw a stream eroding its bed or banks.

2. True, some streams are often muddy, which is interpreted by certain geologists as evidence of erosion, but the amount of detritus thus carried is trifling, if it is measured without prejudice.

3. Rivers deposit detritus in certain places; therefore they cannot erode.

4. In some places rivers flow over soft material without moving it; hence they never erode.

* Ice Erosion Theory a Fallacy, by Prof. H. L. Fairchild. Bull. Geol. Soc. Am., vol. 16, pp. 13–74.

5. In many places no deposits from rivers are seen. If there are no deposits, there can have been no erosion. The amount of deposit discovered must equal the amount eroded, for none is carried to the sea or otherwise hidden.

6. The water in the middle of a stream moves faster than that near the bottom or sides; hence the upper layers move over the lower layers, and the latter thus become nearly stagnant, and lose whatever cutting power they might have possessed.

7. Water, being liquid, flows around and over obstacles instead of cutting them away. The existence of an island in a stream is conclusive proof of the stream's inability to erode. Being liquid, water cannot hold up its cutting tools to their work.

8. The fluency of water diminishes with the amount of sediment carried. Since a river has no means of getting rid of its load of detritus, this load accumulates near the mouth, where it must eventually become too great to allow erosion; hence stream erosion, if there be any, must be confined to the upper reaches of the streams, where the load of detritus is moderate.

9. True, flowing water does change the form of canyons carved by other agencies. Thus it changes the cross-section of a glacier-carved valley from a U shape to a V shape, but we will not call this erosion.

10. It is perfectly possible for streams to carry sharp-edged sand along their bottoms and sides without doing any erosion.

11. If one cannot prove absolutely that erosion is in any case caused by running water, therefore it must have been done by ice.

12. The majority of geologists and physiographers are in accord with these views. H. G.

Field Courses in Geology.—A joint announcement has been issued describing the field courses in geology which will be given during the summer of 1905 by Chicago, Columbia, Harvard, Johns Hopkins, Kansas, Minnesota, North Carolina, Ohio State, Leland Stanford Junior, and Wisconsin Universities. There is also an inter-collegiate Appalachian course of five weeks' duration, which will be given under the direction of several instructors, and will include the study of the tertiary and cretaceous formations of Maryland, the paleozoic strata of the Susquehanna-Juniata district of Pennsylvania and central New York, the crystalline and paleozoic rocks of the Little Falls district of eastern New York, and the metamorphic and triassic rocks of western Connecticut. The courses offered by the several universities cover a wide range of territory, extending from Vancouver Island and California, on the Pacific coast, to North Carolina, Maryland, and New York, on the Atlantic, while one course is announced for Iceland, where four weeks will be spent in the study of volcanoes, glaciers, and geysers. Each of these courses will be under the guidance of a geologist familiar with the geology of the region studied. In the list of instructors appear the names of the following well-known geologists:

J. C. Branner, Wm. B. Clark, H. P. Cushing, Wm. M. Davis, A. W. Grabau, C. W. Hall, E. Haworth, W. H. Hobbs, Charles S. Prosser, R. D. Salisbury, N. S. Shaler, Stuart Weller, J. B. Woodworth, T. C. Hopkins, S. Barrell, R. T. Chamberlin, W. W. Atwood, T. A. Jaggar, Collier Cobb, and J. F. Newsom.

THE ECONOMIC IMPORTANCE OF THE PLATEAUX IN TROPIC AMERICA

BY J. RUSSELL SMITH, PH. D.

Tropic America presents the unusual spectacle of a region in which one type of district supports most of the population and another supports the more important foreign trade.

In temperate North America and in Europe the centers of population and production are upon the lowlands. In tropic America the centers of population are upon the highlands,

while the lowlands are the natural place for the production of the most desired products of that zone. Accordingly, the majority of the people live upon the poorest land, in positions very difficult of access to commerce, and the fertile and accessible regions are unsettled, while the civilized world experiences a growing demand for the really tropical products, which they now produce in an unsystematic way.

The tropic highlands, in one-half or more of their exports, are competing with temperate-zone lands. The lowlands are the real tropics of commerce. The economic question is, Can they become populated and developed?

Two methods are now available—the importation of the Asiatic coolie and the application of science to make these lands habitable by Caucasians. The first method is being successfully tried in some countries and the second is full of possibilities. Science is just beginning to be applied to the problems of eliminating disease, improving tropic agriculture, and overcoming the difficulties of environment. The present century may witness the opening up of practically a new world to population and commerce through the settling of this now neglected part of the world by people who will at least be socially and industrially organized by the most advanced races.

THE EXPLORATION OF ALASKA

BY ALFRED H. BROOKS, CHIEF OF ALASKAN DIVISION, U. S. GEOLOGICAL SURVEY

The first knowledge of Alaska was obtained by the Russians, who in the early part of the eighteenth century had established themselves on the western shore of Bering Sea and first learned of the continent beyond the sea from the natives, for it was not until 1841 that they obtained any definite knowledge of Northwestern America by personal observation. It was then that Bering made his fateful voyage and definitely established at least one point on the mainland of Alaska. Subsequently exploration appears to have taken place from three directions. The Russians came from the west, across Siberia, Bering Sea and Straits; the English from the east, by way of McKenzie Valley, and navigators of various nationalities explored its coast, approaching from the south by following the eastern shore of the Pacific. Among the important expeditions were those led by Bering, Lütke, Kotzebue, Cook, Vancouver, Franklin, Beechey, Malaspina, La Pérouse, and several Spaniards. By the middle of the eighteenth century the coast-line of Alaska was fairly well known, but the detailed charting has not even yet been completed, though the United States Coast Survey has been actively at work for many years. Of the interior of Alaska the Russians knew comparatively little, though they explored the lower stretches of the Yukon, the Kuskokwim, and Stikine. The Upper Yukon was reached by the Hudson Bay traders in the middle of the nineteenth century.

In 1865 the exploration of Alaska was much accelerated by the work of the corps of explorers organized by the Western Union Telegraph Company, of whom William H. Dall and Robert Kennicott were the most prominent.

When Alaska came into the possession of the United States, but little attempt was made to explore its interior, though a few expeditions were sent out under various auspices. Thus it was that Schwatka made an exploration of the Lewes and Yukon rivers, though these were already pretty well known, thanks to the traders and prospectors. Allen traversed the Copper, Tanana, and Lower Koyukuk rivers, while Stoney took up the exploration of the Kotzebue Sound region, and in the same district Cantwell and McLannigan made important explorations.

Though public enterprise amounted to little, yet the ever-ready American frontiersman and prospector penetrated this wilderness and did much in making it known to the world. Among the most prominent were Frank Densmore, Arthur Harper, Jack McQuestin, and Jack Dalton.

In 1891 the Coast Survey was represented in the interior in Alaska by parties which located the international boundary and made an exploration through to the Arctic coast from the Yukon drainage basin. During the same period Schwatka and Hayes made a journey of exploration from the Yukon to the Copper by way of the head of the White.

It was, however, not until the discovery of the famous Klondike gold fields that Congress awoke to the necessity of systematic explorations and surveys of this great area. Appropriations for this purpose were made in 1898, which have been continued up to the present time. Much of the interior of Alaska has been explored by the many parties of the United States Geological Survey. These have covered an area which can be approximated at 100,000 square miles, and now practically every large river in the territory except the Noatak, Colville, and Alsek has been surveyed. All of the mountain ranges except those of the extreme northern part of the territory have been outlined by exploratory surveys, and much of the great interior basin has been mapped with a sufficient degree of accuracy for present purposes.

Of unknown regions there are in Alaska only three of considerable extent. The smallest of these embraces the great snow-covered

Saint Elias range, which, though but a short distance from tide-water, is so inaccessible that little is known of its geography or geology. A second unexplored area lies adjacent to the Arctic coast and the international boundary, and extends southward down into the Yukon Basin, and embraces about 40,000 square miles that are practically unknown.

A third unexplored area lies in the northwestern part of the territory west of the 151st meridian and north of the 68th parallel. This also includes about 40,000 square miles and is almost entirely unknown, though Schrader and Howard have traversed its eastern margin. Of little-known areas we have also the Kuskokwim Basin, which probably embraces some 15,000 square miles, less than half of which have been surveyed.

GEOGRAPHIC LITERATURE

Anemia in Porto Rico. By Bailey K. Ashford. Bureau of Printing, San Juan, Porto Rico. 1905.

Another convincing instance of the great work being done by our government to help the people in our semi-tropical possessions is given in the recently published report of the commission appointed to report on the possibility of suppressing "anemia" in Porto Rico. Anemia has always been more or less active in Porto Rico, but after the hurricane of 1899 it became specially troublesome. People thought that it was the result of poor food, worry, destitution, etc., but Dr Bailey K. Ashford, U. S. Army, identified it as the same disease as tropical anemia, prevalent in Mexico and elsewhere, and caused by a parasitic worm in the intestines.

Through the coöperation of Governor Hunt the Porto Rican legislature in the winter of 1904 was induced to appropriate $5,000 for the study and treatment of the disease. Governor Hunt appointed as members of the commission Captain Ashford, Surgeon W. W. King, and Dr Igaravidez. These gentlemen made a tour of the island, examining and treating 500 to 600 persons a day. The patients would begin to arrive early in the morning, in many cases having traveled since the day before, generally on foot; sometimes they spent several days on the road. Very bad cases were carried in hammocks to the camp. In practically every case the disease was found to be caused solely by "uncinaria." Patients were given a prescription which they presented to the apothecary, who delivered the medicine with directions as to how it should be taken, the patients, or those accompanying them, being required to repeat these instructions until they were thoroughly understood. They were directed to return in one week for reëxamination and more medicine, most of them doing so with considerable regularity. The more advanced cases were treated in hospitals hastily constructed of tents.

In his report on the work of the commission Captain Ashford states that probably 90 per cent of the rural population of Porto Rico suffer from anemia. Such a large percentage of affected must injure the economical power of the country. The parasitic worm usually gains entrance by the penetration of the larvæ through the skin. The disease is curable in the great majority of cases and can, believes Captain Ashford, be practically stamped out of the island if hygienic laws are enforced. The limited sum at the disposal of the commission enabled them to carry on their work for a few months only. The members received no salary, and each member provided his own instruments and laboratory equipment.

Sweden: Its People and Its Industry. Edited by Gustav Sundbärg. Pp. xi + 1143. Illustrated. Stockholm. 1904.

This is the third edition, the first

being in French and the second in Swedish, of a most comprehensive and valuable hand-book of Sweden, historical and statistical. It comprises about one hundred and fifty separate memoirs, written by a hundred or more of the leading Swedish scientists and officials, covering almost every phase of industrial, social, commercial, or agricultural activities. The principal subdivisions are physical geography, the Swedish people, constitution and administration, education and culture, agriculture, forestry, fishing, mining, manufactures, commerce, navigation, internal communications, credit and insurance, industrial and labor legislation, and social statistics.

The volume is provided with excellent maps, well chosen and attractive illustrations. The translation is good, the typography of a high order, and an index enhances the value of the volume for standard reference. The publication is most creditable to the Swedish government and to its editor, G. Sundbärg, who has compiled valuable and comprehensive statistics, extending in some instances to the end of 1903. A. W. G.

The Moon. By William H. Pickering. Pp. viii+103. 12⅝ x 10⅝ inches. New York: Doubleday, Page & Co. 1903. $10.00 net.

With the aim of summarizing some of the more recent lunar knowledge chiefly acquired in the Harvard observatories located in low latitudes, Prof. Pickering has given us one of the most entertaining volumes in existence on this subject for the general reader. It has been found that the clearest atmosphere can be obtained only in the trade-wind belt, which is so largely free from the terrible storms raging in the temperate zones. Hence chief progress has been made in the two stations of this foremost American university. Prof. Pickering treats of the origin of the moon, its motion, its physiography, with a very readable sketch of the history of lunar research. There are a number of beautiful illustrations based largely on the photographs taken by the author and his assistants. The whole volume is in the fine typographical dress usual with this firm of publishers.

C. M.

Early Western Travels, 1748–1845. Edited by Reuben G. Thwaites. Vol. VII, Buttrick's Voyages, 1812–1819; Evans' Pedestrious Tours, 1818. Pp. 364. Vol. X, Hulme's Journal, 1818; Flower's Letters from Lexington and the Illinois, 1819; Flower's Letters from the Illinois, 1820–1821; Wood's Two Years' Residence, 1820, 1821. Pp 357. Cleveland: Arthur H. Clark Co. 1904. $4.00 *net.*

Buttrick's experiences give glimpses of life in Kentucky and along the Natchez trail, while Evans describes conditions in Michigan and along the great rivers from Pittsburg to New Orleans.

Volume X covers the English settlement made under Morris Birkbeck and George Flower in Illinois near Cairo, which led to violent discussions in which William Cobbet was prominent. Wood presents in clear and definite form the thoroughly novel conditions of agriculture and trade of frontier life and the social problems which confronted the English colonists.

Both volumes are specially interesting as illustrating the conditions of life west of the Alleghanies after the war of 1812, when tens of thousands removed from the Atlantic states to these fertile regions. In general the annotations of the editor are pertinent and judicious. A.W. G.

The Future of Road-making in America (Historic Highways of America, vol. 15). By Archer Butler Hulbert. Pp. 211. 7⅝ x 5 inches. Cleveland: The Arthur H. Clark Co. 1905.

With the aid of Messrs Dodge, Elridge, Page, of the United States govern-

ment service in Washington, and Mr Harrison, of New Jersey, Mr Hulbert gives us a symposium on the vast problem of good roads. He contributes the first paper, which forms the title of the volume, composed largely of extracts from the words of other men summing up the blessings of improved highways. His co-laborers treat of government aid, the advantages to farmers, the proper material for constructing the bed, and the methods followed in New Jersey. The volume is thus a happy combination of the ideal and the practical, all told in readable style, with the aim of popularizing the subject. Hence technical details are pleasantly passed over, though enough of the realistic side is presented to assist a man of fair common sense to undertake some improvement himself, since the views of experts are rather liberally borrowed. One of the most striking utterances on this transportation question is that of President Winston, of the North Carolina Agricultural College. He declares that bad roads are unfavorable to matrimony and increase of population. In this day of interest in the Racial Suicide theory this position should arouse the greatest attention. C. M.

The Great American Canals, vols. I, II. By Archer B. Hulbert. Cleveland: The Arthur H. Clark Co. 1904.

I. The Chesapeake and Ohio Canal: The Pennsylvania Canal. Pp. 231. Illustrated.

II. The Erie Canal. Pp. 234. Illustrated.

These volumes, 13 and 14 of Historic Highways, supplement the series of memoirs on the public roads of the United States by accounts of the great waterways. The Chesapeake and Ohio Canal was a continuance of the effort of the Potomac Company fostered and directed in its earlier years by George Washington to provide adequate transportation facilities to the trans-Alleghany region. Through an appropriation by Congress the route for a canal from Washington to Pittsburg was surveyed, but construction was never completed further than Cumbe Island, Md. This point was reached in 1850 after twenty-six years' work and at a cost of more than eleven millions. The rivalry between the canal and the Baltimore and Ohio Railway, as well as the mixture of politics and business which practically doubled the cost, affords interesting reading.

More important was the Pennsylvania Canal, which by a system of railways and waterways 394 miles in length, united Philadelphia and Pittsburg. It consisted of a railway to Columbia, on the Susquehanna, whence canal-boats ran through to Pittsburg, crossing the Alleghanies by a portage road from Hollidaysburg to Johnstown, on the Allegheny. This system, although twice the length, cost one million dollars less than the Chesapeake and Ohio Canal.

The two canals here described may be said to represent the rivalries of the ports of Baltimore and Philadelphia.

The Erie Canal, while representing the commercial interests of New York, proved to be more permanent and far broader in its utilities. It affected the trade of the entire region of the Great Lakes and of the upper Mississippi, and this marked an important epoch in the commercial history of the United States. It is to be regretted that the space given to local politics was not used for an analysis of its economic influences.

A. W. G.

Historic Highways: Pioneer Roads, vol. I. By Archer B. Hulbert. Pp. 200. Illustrated. Cleveland: The Arthur H. Clark Co. 1904.

This volume is rather heterogeneous in its material, which covers the evolution of turnpikes from trails and brief experiences in frontier travels. The volume scarcely equals in interest others of the series. A. W. G.

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